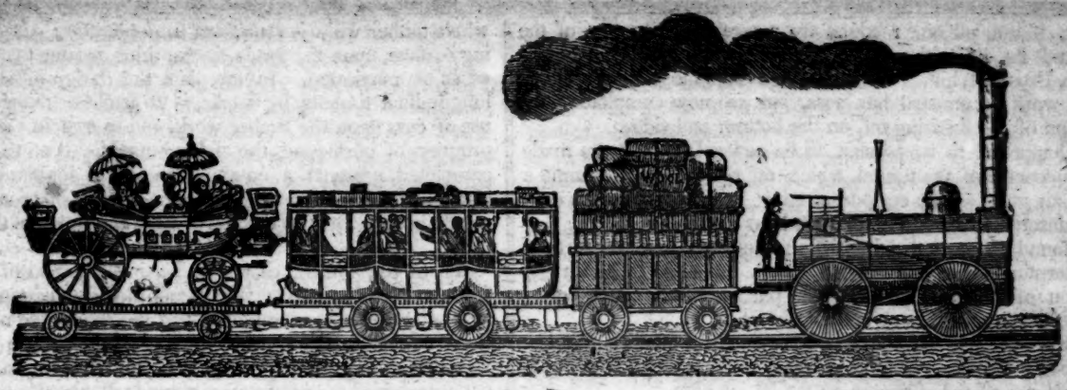

AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } Editors and Proprietors.] SATURDAY, AUGUST 26, 1837. VOLUME VI.—No. 34

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, AUGUST 26, 1837.

☞ Suspension of Publication, *for four weeks.*—The difficulty of *collecting*, or raising money, compels us to suspend the publication of the Journal for *four weeks*, when it will be resumed, and the present volume completed; and if those in arrears will pay what is due, the work will be continued.

SUSPENSION!—It is exceedingly mortifying—even at the present period of *broken promises*—to be abliged to *suspend* the publication of the Railroad Journal; but we are compeled to do so, for a short time—and *only* for a *short* period, as we confidently believe—for the reason that we cannot collect money enough to pay the compositors and pressmen for printing it. To those of our readers who *have* paid in advance, according to the *terms*, this may appear singular, yet it is not by any means a singular circumstance at the present time for Periodicals to fare hard.

The Journal has been published nearly six years; and its subscribers are scattered not only over the whole United States, but also in Europe; and it is therefore exceedingly difficult, we are aware, for them to make remittances, and far more difficult for us to make collections by agents, consequently there is a large amount, not only for the present, but also for *past years*, remaining unpaid—*the amount exceeds six thousand dollars*—yet we are unable to collect enough to defray the *unavoidable* current expenses; and must therefore suspend its publication for *four weeks*, until we can receive from those subscribers who have not yet paid, the amount due, for which bills have been forwarded. In order that each subscriber, whose account appears on our books *unpaid*, may know how it stands, we shall mark on the margin of *this* number, the date paid to, and amount due up to 31st December next, or close of Volume VI. This is done with the hope that those who are indebted for the Journal will pay the amount *at once*, to enable us to complete the volume, and thereby do justice to those who *have* paid up. It is done with a view of showing those who have for years received the Journal without having complied with the conditions of its publication, that is to say *without paying for it*—that they have aided in producing this suspension of publication—and that unless they remit promptly the amount due, they will compel the senior Editor, who established the work, *in opposition to good advice*, to relinquish his interest entirely at the close of the present volume; as he has already been compelled to make an *Assignment* of his interest in it to secure his creditors—who have aided him in sustaining it thus far.

It should not be forgotten that the entire materials of the Office, and 400 full sett of the work, were destroyed by the *great fire*, and therefore that the present *famine* bears upon it with a heavy hand.

The publication *will* be resumed again, in four weeks; and the Volume completed by the close of the year—if those in arrears will deal justly by us, and *pay what is due.*

Those who have paid up in advance, *may rest assured that the volume will be completed*,—to those we acknowledge our indebtedness, and pledge ourselves to complete *the* volume,—and we *hope many* succeeding volumes; *that*, however, depends upon those who have *not* yet paid.

☞ We ask that remittances may be made in such bank notes ar are at the *least* discount *here*—we have paid from *five* to *twenty five* per cent discount on notes sent us—and without *grumdling* too, yet we cannot do it long and publish the Journal—the *best* you have, and *all* that is due, is all we ask—*if we have it soon*—

East New-York.—We publish in this number a description and plan of this *new* city. We have long been aware of the movements of gentlemen of enterprise and perseverance in this matter. It is not the work of a *few days* and a *Lithographer*; but it has been for more than two years in progress, and will eventually show the judgmemt and enterprise of its projector.

Morris Canal.—This canal has been navigable to Jersey city for several months; but we have never examined the line of the work until this week. The section between Newark and Jersey city was a difficult one to construct, most of it being marsh, and another portion of it requiring a heavy sea wall. The route is very circuitous, in consequence of the Bergen ridge. There is now very little business doing on the canal between Newark and Jersey city.

New-Jersey Railroad.—The work on the deep cutting through the Bergen Ridge, is progressing. It is a heavy and expensive section; yet it will soon be passable for Locomotives.

New-York and Harlem Railroad.—On passing over this road recently, we were agreeably surprised to find it so nearly completed.

Most, if not all our readers, are aware of the nature of the work and its difficulties. The greatest of these is the tunnel through Prospect hill. This and the adjoining deep cuts are there a work of unusual hardness, but are now completed with exception of the dressing off, on the bottom and sides.

We happened to be present while several blasts were made near the centre of the tunnel, which on this occasion became a mighty air gun. The curious ringing and reverberations cannot be described to one who did not hear them.

We found the cars running from the north side of the tunnel to the termination of the road at 125th street, so that with the exception of the tunnel and a small portion of the cut on either side, the whole road is now actually in use.

We were pleased with the neat finish given to much of the new work upon the road. The bridge over Harlem Creek is a handsome and substantial structure on the lattice plan.

The company are also adding to the finish and safety of the road by substantial slope walls along the whole line of earth excavation.

We understand that it is intended to run the cars from Walker street to 125th street, the entire length of the road, before the end of September.

This arrangement will be as much to the profit of the company, as to the benefit of individuals residing or doing business in the upper part of the city.

The new depot on 42th street with its ample stock of substantial and elegant cars, gives proof of the endeavor to meet the public wants.

At present we know of no route more interesting to a stranger or citizen than a ride over this road.—The tunnel alone is worth a journey—while the view from the upper portion of the road is very beautiful. Harlem and Manhattanville and the line of houses between them resemble the germ of some great city, while the Bloomingdale Asylum, the mansions of several of our citizens, together with the remains of the old fortifications, on the surrounding heights, give quite an imposing aspect to the borders of the valley. To complete the view the back ground is made by the palisadoes and banks of the Hudson.

On the other side the view over Hell Gate and the last river is quite as beautiful, though different in character.

The green fields of Long Island and the constant play of steamboats over the intervening expanse of water, are in very pleasing contrast with the sterner heights of the North River.

Those to whom this road offers convenience for transit have already made trial of its merits, and we advice strangers and lovers of variety to do the same.

For the Railroad Journal.

ROCHESTER, July 25th, 1837.

Gentlemen,—While on a visit to my family, in this city, after a long absence, in the employment of the Great Western Railroad Company of Upper Canada—to the construction of whose work my services are engaged, the strictures of a writer, under the signature of Q, in your valuable publication of the 15th instant, have attracted my notice. They are of a character, which seems to require of me a few remarks.

The writer labors under some misapprehension of the details of my plan of Railroad; and, by the concluding paragraph of his communication, may be thought to betray other purposes than the promotion of the great cause of Internal Improvement. Critical expositions of every new scheme for accomplishing useful objects, should be read with care, by all who are interested in the objects; and if they manifest intelligence—point out errors—or suggest improvements—should be regarded with gratitude by those, who are especially responsible for their successful accomplishments. It is the part of prudence to gather wisdom, even from an enemy; and if I do not deceive myself, I should feel obliged to your correspondent, notwithstanding his disregard of the courtesies generally held becoming among men striving to apply science to works of immediate and obvious public importance, if his strictures were founded upon an accurate assumption of facts, or illustrated useful principles in any new application.

It would be needless here to give a description of my plan, in detail, as you, Messrs. Editors, in the spirit of justice claiming my thanks, have promised to publish it. To your publication of it, reference is herein made. Such reference will show, that the whole timber work is *embedded in the grade*; and that the bearing surface, upon the grade, is one third greater than Q has adopted as his maximum. In my plan, the design of shoring up the longitudinal timbers, by blocks, is to facilitate the grading, by the use of cars upon the timber work, and to sustain the same in the progress of perfecting the embankments. And the road, when completed, presents a combination of the longitudinal timbers, blocks, cross timbers, scantling, and iron, *incorporated in the grade*, in such form as best, as to resist the action of the engine and train

It is to be regretted, that Q, in his investigation of the different degrees of resistance to flexure afforded by the common plan of wooden railroad, and my plan, had not taken the necessary precaution to assure himself of the correctness of his premises, before proceeding to his conclusions—and still more, that he had not ascertained the accuracy of his deductions, as based upon these premises, before presenting them to the public. In the plan which I have recommended, in my report, string pieces, from 18 to 24 inches in diameter, and hewn upon the *upper* surface, and laid upon cross ties placed 10 feet apart from centre to centre. In the former part of his communication, Q says in relation to my plan, "that the rails are 12 by12 inches, or large enough to square hat size;" and when he gives the result of his investigations, we find him, not content with assuming them at their minimum diameter, but divesting them of their "fair proportions," and actually reducing them to 12 by 12 inches square. This is unjust; and it is an essential fact, in respect to their stiffness. They are so small, *only* at the points of rest; at all intermediate points, they are larger—they are cylinders of not less than 18 inches diameter, with the exception of the upper surface flatted between the ties, and a lineal foot of them contains 1108 cubic inches more than a lineal foot of timber squared 12 by 12 inches.

Q does not present the "modes operandi" by which he arrives at his results, yet it is evident, that finding, as the result of his enquiry, the sagitta or depression of the rail, between the points of support, in my system (with the dimensions which he assumed for it,) to be in the ratio of 2.7 to 1, compared with the same in the old plan, he jumped at the conclusion, that their natural stiffness is in the inverse of this grading; or that the old system is firmer than mine, in the ratio of 2.7 to 1.

Let us examine this, still retaining the ratio at the dimensions given by Q. Suppose the depression of the middle point to be equal, in the two cases: then, on the old plan, for every three feet in the line, an engine must encountre just as much depression as for every nine feet of mine: consequently what Q has interpreted as the measure of stiffness, in the new system, must be multiplied by three, and the result will be correct—showing that my arrangement is firmer than the old, even with rails only 12 by 12 inches, in the ratio of 1.1 to 1.

The comparison when instituted between the two beams actually under consideration, will show a still more decided advantage in favor of stability, in my system, over the old. In the latter, $\frac{1}{10}$ of the solid contact is lost, in dressing the 6 by 6 iron rail, and in preparing it to receive the iron plate. This is a large allowance to make for what is hewn off from the upper side of my rail to prepare it to receive the scantling, it being not more than $\frac{1}{12}$, and generally less. But we will assume the rails of one system to consist of hewn timber 6 by 6 inches; and of the other to consist of round timber 18 inches in diameter. The beams being supported at each extremity, and loaded at the middle point—the formulas which apply are

For the Cylinder.	And to the Prism.
$F = \frac{W\,(2\,c)\,3}{A\,12\,\varpi\,r\,4}$	$F \frac{W\,(2\,c)\,3}{A\,4\,a\,4}$

in which we represent, by

F. The sagitta, or depression of the middle point of the beam.
W. The pressure, to which the rail is subjected,
A. The co-efficient of elasticity.
a. Side of the square, or transverse section.
r. Radius of the base of the cylinder.
2 c. The distance between the points of support.

By substituting for a, r, 2 c and w, their proper values we obtain for the cylinder $F = 4,6 \frac{W}{A}$

for the prism $F = 5,2 \frac{W}{A}$

W and A being of course constant quantities and known, or susceptible of being known, the results show a depression, in the ratio of 1, in my system, and of 1.1, in the old; and multiplying by 3 as before, for the difference of distance under consideration, we have advantages in stiffness, in my system, in the ratio of 3.3 to 1.

An examination in relation to *rupture*, would show a still greater superiority: for the strength increases with the cubes of the sides of transverse sections, in prisms, and with the cubes of radii of the transverse section, in cylinders, while it decreases with the length.

It ought to be observed here, that experience shows a decided advantage from the use of round timber, in the grade, rather than square,—with the round, the grade unites more perfectly and equally. The action of the rains, and use of the horse track, presses the earth closely and uniformly against the lower sides of the round, soon producing a solid and stable connexion between the timber and the grade, of considerable effect in preserving a proper adjustment of the track—while the difficulty of passing the earth, at all, under the lower angles of the squared timber, hinders its firm connexion with the grade.

Any improvement in the form or mode of executing the details of a railroad, though of little estimation, in a short distance, on one road, becomes of serious concern, in the vast lines of road projected throughout the entire country, whether the improvement relates to cost of construction, stability of the work, or the facility and safety of its use. In the common form of constructing wood roads, great difficulty exists in giving to the longitudinal sills, through the entire bearing surface, sufficient vertical strength, particularly in soils of secondary formation. Various sizes of these under timbers have been adopted, and Q claims one of 6 by 12 inches of prepared timber, and of considerable length. On the road from Buffalo to Niagara Falls, a less size was used. It was found insufficient; and longer timber was subsequently employed than that approved by Q, before the road was deemed fit for the use of locomotive power.

The grade of the road is the legitimate base on which the superstructure is to be erected. It is necessary to give sufficient bearing surface and vertical strength to the sills, connected with the grade, to sustain the superstructure, and all the weight of the engines and trains; for if the sills yield, the superstructure, which they support, yields also. Hence the sills must be large. On these sills, in the common form of road, cross timbers are placed three feet apart, on which are laid rails required to be of sufficient strength to sustains the weight of the engines and trains also, between the cross timbers, because they have no support from the grade, except at the points of contact with the cross timbers. These rails receive the iron, and thus the frame of the road is completed. Proper materials for this description of road, Norway pine, red cedar, and oak, are not easily obtained, in sufficient quantity; and when actually used in the road, are exposed to rapid decay.

My plan admits of using all sorts of timber, and secures greater strength and durability. By placing my cross ties *deep in the grade*, they are almost out of the reach of decay, and by using larger sills in a rough form, also *buried in the grade*, an additional advantage of increased strength is obtained. Instead of the cross timbers *above* the longitudinal sills and the small rails, adopted on the old plan, I employ a small scantling, *continuously* sustained by the strong sill in the grade, and the grade itself; on which scantling the iron is placed to receive the wheels of the cars and locomotives.

On the old plan the entire timber work, above the sills, is unsightly, decaying, dangerous, not equally and continuously supported—and unnecessarily exposed to derangement by frosts. On my plan these evils are either entirely removed, or greatly diminished. The ordinary plan of railroads is copied from the first experiment model adopted in England; and places the timber *above* the surface of the grade. The plan recommended in my report, claims to be a combination of science and art, which the timber work by a more compact connection of and by being placed *within the grade*, secures in a much greater degree, the important desiderata of strength, durability, and cheapness, and by substituting timber for the stone and iron, is happily adapted to the use and circumstances of our country.

What is the necessity of the upper frame work upon the old plan, which, besides the evils already enumerated, involves great expense? I have thought it very desirable to provides substitute for this frame work; and the form of road which I have recommended, has proved to be a valuable substitute. The wood roads actually made, upon the old plan, have proved so imperfect, temporary, and costly, that iron and stone roads are claimed to be the cheapest, where capital can be had for their construction. But it will be long before sufficient capital can be found to open all the roads actually wanted and projected, in the vast range of North America, unless a form of construction cheaper than any in which iron and stone are the chief materials, can be adopted.

The essential facts respecting the amount of outlay required to open a railroad, are greatly in favor of my plan. In all the newer parts of our country a wood road can be constructed upon my plan with greater strength, permanency and beauty, than upon the ordinary plan; and at *one half the cost*. And I will here say, that none of the features of my plan are derived from the invention of Mr. H. Allen. I understand this gentleman contributed largely to the advancement of the Charleston road, by driving piles, making bents, and forming a kind of truss work, to continue the road over marshes and bottom lands, in place of supporting it in such places by embankment. But this does not compare, in any respect, with the first principles of my form of road.

Experience is the best teacher. The rail road from Rochester to Batavia, 32 miles in extent, was made on my plan. The grading of this road exceeds one million of yards, the cuttings of which were removed into the embankments, at an average distance exceeding one-fourth of a mile, and some portions exceeding a mile. The work was accomplished by cars of eight wheels, carrying at each load 8 cubic yards of earth (about 12 tons weight) into the embankments, upon sills supported by posts. The track of this road crosses swamps, soft and hard land, in considerable variety. It is now used by a heavy class of locomotives, on the *same foundations* prepared for its grading. It has stood the test of two severe winters, and it is now in better condition, and its adjustment better preserved, than any of the expensive roads, constructed on the ordinary plans, in our country; although about one-third of the timbers in it (its posts and sills) are less than two-thirds the minimum size recommended in my report. On this road your correspondent, or any other person, may see the ordinary business of passenger-trains, and a great extent of freighting business, performed at the most rapid rates of motion usual on the most expensive railroads of the country, without producing the evils imputed to the plan by Q.

This road has been made at the expense of several enterprising and intelligent gentlemen residing in its vicinity, who have watched its progress at every stage, and its use in every emergency, with all the vigilance demanded by large pecuniary investment; and so satisfied are they of its advantages over other plans of construction, that they have commenced extending the road, upon the same plan, 36 miles further, from Batavia to Buffalo.

Entertaining, as I do, a very exalted opinion of Messrs. Barlow, Tredgold and Dupin, and duly appreciating the benefits, which they have conferred upon the cause of internal improvement, and science in general, I must be permitted to protest against their being held responsible, for every mistaken application of formula, however correct in themselves, or every deduction from principles however rigorously demonstrated. Even the authority of their names will not sanction the application of their theories, to subjects not legitimately within their sphere.

It is the province of the Engineer, "to produce the greatest mechanical results, with the greatest economy," —not that short sighted economy, which looks to *one* object, and *one alone* —but economy in its enlarged and liberal sense, looking to *ultimate* as well as *immediate* advantage, and which, taking into consideration all the circumstances of the case, and especially the requisite expenditures of time, money, labor, and materials, adapts its exertions most happily, and without loss, to all With no disposition to undervalue the aid, which science lends to the advancement of works of internal improvement, I must be allowed to say, that the most enlarged mechanical science will avail but little unless guided, in its application, by *sound discretion*. Where timber costs nothing, and must be removed, to make it a substitute for costly materials, in constructing any

work, as far as may consist with the object of the work, is the dictate of economy. It would be manifestly injudicious to adopt the same plan of operation, in a project, which might be equally well effected by the use of timber, iron, or stone, without taking into account the cost of these various materials, at the location of the project. If the live oak of the South would alone answer the essential demands of a timber structure to be erected in Canada. It is plain, that the care to save that article and the labor of its long transportation, should be very different from the care to save timber of other descriptions to be found upon the very site of the structure, and necessary to be removed, at greater expense *away* from the structure than to be employed *in* it, if such other timber would as well answer its demands.

I am not unaware of the situation of the Engineer Corps of the United States. The demands of the service have called into the field all the assistance, that could be obtained. In many cases, individuals have been advanced early to the discharge of important duties. All have their theories; most are tenacious of common usage. To depart, in any measure, from this requires great moral courage, and some self-confidence. A young Engineer, though of respectable scientific attainments, would not adopt a new plan, involving great anxiety for himself, and large disbursement for those, in whose employ he might be, until it had obtained the sanction of men high in authority. This would be the course of prudence, of reputation and of probable support for himself and family, if he had one. But it would not be the way of improvement. By a combination of prudence and prejudice many great improvements have either been wholly rejected or made their way slowly to public favor.

The subject of railroads enters largely into the enterprise of our country. And men, not professional, understand yet but little of its details. This of course imposes great responsibility upon Engineers; and they are somewhat divided into advocates of different theories. It has long appeared to me desirable, that men of respectable attainments, and desirable experience, in the applications of science to the opening of railroads and canals, should confer together upon these subjects more than they do; and take such measures as might be efficacious to countenance and recommend new inventions, worthy of approbation, in any branch of their pursuits. Your Journal the appropriate vehicle of intercourse between our countrymen devoted to these concerns, and by communications to the public, through its columns, their digested and deliberate views, principles and plans, they would advance one of the greatest of our public interests, extend their individual reputation, and afford a useful asssistance to a meritorious and much needed publication.

I trust I shall not appear officious, in the remarks called from me by the strictures of your correspondent. I have meant only to justify myself, and my plan of railroad, from objections founded in error. And if my labor shall tend to commend to public favor, any new and useful modification of the details of road making, and thus favor the great interests of the country, I shall be more than compensated for it, and for the uncourteous animadversions to which I have been subjected.

With much respect,
your ob't serv't,
ELISHA JOHNSON,
Civil Engineer.

The following communication is from a gentleman whose opinion, in relation to such matters, is entitled to respect. His doctrine of the *importance of the introduction of a cheap mode of constructing railroads* in this country, and especially in the new and sparely populated States, will find more advantages now than formerly. He will find on referring to the Journal that we have recently published the Report refered to, and a communication criticising it.

NIAGARA FALLS, August 15th.

Messrs. Editors,—The prosperity of our country is so intimately identified with the completion of its contemplated lines of intercommunication, that all good citizens must look with deep interest upon every measure which is calculated to advance or retard such an event. The financial embarrassments of the community have diverted into other channels, the capital designed for many of the most important *links* in the *great chain* of works; and the operators or projectors have been forced to their expenditures to a very limited amount, and in many cases, to abandon their enterprise altogether, or defer its completion to more propitious times. For such a period, *all* are devoutly wishing and *most* are *confidently* hoping. In the mean time, it becomes us to avail ourselves of the present moment, to look back upon the past, and profit by its tachings, and to look forward to the future, resolved to practice the lessons of wisdom. With our great natural advantage—our vast resources, we cannot for a moment admit the thought, that these stupendous plans must ultimately fail. There is capital enough—there is enterprise enough in the country, if properly directed, to accomplish all that the *real* wants of community demand. These wants *must* and *will* be met. The demand will create the supply. The business operations of the country *will* be resumed—the earth is yielding her bounteous supplies—the products of the fertile fields of *the West* and the *far West*, will seek a market, and it is the interest of all, and especially of *Eastern Capitalists* to furnish easy means of communication between the Atlantic cities and the interior. Sagacious capitalists, foreseeing the coming want of these channels of communication, are already seeking among them, a safe investment and sure return, for capital unprofitably or unsafely employed elsewhere.

The tremenduous revulsion which has every where been felt, will not be without its benefits, if from it we learn a lesson of wisdom. It should teach us the value of economy—the neces sity of caution. It should teach us to husband well our resources, and so to expend the money appropriated to these objects, as to produce the greatest amount of benefit.

The inquiry has been often made, whether some plan could not be devised for constructing *railroads*, which should present the requisite degree of strength and durability, at a less expense than in the present modes. It has been urged that American Engineers follow too closely in the footsteps of the European—that they adopt the expensive plans of the latter, which apply to short routes connecting populous cities, without sufficiently regarding the different circumstances in which we are placed. Called upon to construct extensive lines of road, through a thinly populated, and perhaps uncultivated region, and having a limited amount of Capital at our command; it becomes necessary (agreeably to the homely proverb) "to cut our coat according to the cloth."

True, some modifications have been made. The substantial structure of stone and iron, have given place to wood and the plate rail. But the cost of this, is in many instances beyond our means, while some defects in the system abridge its usefulness—the profits being diminished by the tax for annual repairing. The great desideratum—cheapness of construction combined with strength and durability, has not yet been obtained.

Having recently had occasion however, to traverse some portions of the West, I have availed myself of the opportunity presented, to examine the different roads which came under my observation, and to obtain such information in relation to the subject as lay within my reach. In the course of my inquiries I accidentally met with a report made to the Detroit and Niagara Rivers Railroad Company, by Elisha Johnson, Esq., their Engineer. He therein developes a plan of construction, which seemed to me to be more feasible than any that I have met with, and in short, to supply the very desideratum of which I speak. Not having a copy of the report at hand I cannot give you its details. But the peculiarities of the plan I believe to consist in using timber in its rough state, (the *upper side* only being hewn) which is so combined as to offer the necessary resistance to the action of the train, and in its being incorporated with the grade, supporting, and being supported by it, while the earth with which the timber is covered protects it from the action of the sun and rain, and prevents its decay. Mr. Johnson shows by proper estimates that the expense of preparing the road to receive the iron rail is only one half that of the usual mode.—And to extensive woodland districts the plan seems peculiarly appropriate, since the timber can be cut down, and placed in its bed and suitably dressed to receive the rail, at the same expense as would be incurred by removing it from the line of road.

For the manner in which the road answers the end in view, that of affording an unyielding support for the engine and its train, Mr. Johnson refers with apparent confidence to the Tonawanda Railroad which was built by him two years since on this plan. Desirous of satisfying myself on this point, I examined the road with considerable care and attention. The rails appeared in most excellent adjustment, and the condition of the

road to be altogether superior to any over which I have travelled. I conversed with several gentlemen of intelligence, all of whom agreed with me in this particular. I was moreover informed, that so little had the road felt the frost of the last two winters that not a dollar had been expended since its completion for repairs in consequence thereof. The action of the engines and train instead of *discomposing*, tends rather to *consolidate* and *perfect* the grade.

Satisfied myself of the excellence of the plan, by all the light which examination and enquiry, aided by some little knowledge of the subject had been able to shed upon it. I thought I could not render a more acceptable service to the great cause of Internal Improvement, than by calling the attention of your readers both capitalists and members of the profession, to the subject in question.

If my views of the subject be correct, Mr. Johnson, by placing within our reach, a plan of construction by which the advantages of railroads may be secured at a comparatively small expense, has opened a new field for successful enterprise. Regions hitherto debarred by position and circumstances from availing themselves of these modes of communication, will now find them within their means. I regret that I can only furnish you with a meagre outline of the plan, but presume you have received the report, and hope you will give it publicity.—Indeed, as I have not seen your Journal for some weeks, owing to my absence from home. I do not know but you have already done so. I hope the plan may receive an examination, commensurate with the importance of the pretensions which it puts forth. Let it stand or fall by its own merits. Although disposed to judge favorably of it, I shall not be sorry to see it strictly scrutinized. Yours, &c., W.

MEMPHIS AND LAGRANGE RAILROAD.—We are indebted to a friend for the following account of this road. It will truly be, as it is termed, "an important link" in the great chain connecting the Mississippi with the Atlantic—a chain which the good sense of the people will not long permit to remain incomplete. About 200 miles, or one third of this route is now constructed, and in successful operation; comprising two of the first completed roads in this country—and more than another third is now in course of construction, thus placing beyond doubt the early commencement of the remainder.

This road, and the Charleston and Cincinnati road, will open the interior of Allabama, Tennessee, Mississippi, and Kentucky, to the Atlantic at Charleston, and produce a wonderful change in the condition of each—and Charleston, will by no means be the least benefitted.

Extract from a letter dated Lagrange, Tenn. July 31, 1827.

The Lagrange and Memphis Railroad is progressing rapidly, and will be completed in 1840. Distance 50 miles with a lateral of 13½ miles from Moscow to Summerville. When our road is completed it will form an important link in the great chain, connecting the Mississippi with the Atlantic. I am astonished that this great project attracts so little attention. It is to my mind by far the grandest scheme for railroad improvement in the United States. The whole cost will fall short of $5,000,000. The cheapest road for the distance in the world.

From *Memphis** to Lagrange, 50 miles under contract.
" Lagrange to Tuscumbia, 100 miles, not under charter yet.
" Tuscumbia to Decatur, 43 miles, finished in 1834.
" Decatur to Rossville, 100 miles, Via Tennessee river.
" Rossville to Athens, 140 miles, under charter and survey.
" Athens to Augusta, 85 miles, under contract, part comp't.
" Augusta to Charleston, 135 miles, in successful operation.
653 miles or there abouts.

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* The Chickasaw Bluff presents a front on the Mississippi river of about 4 miles, and is the best situation for a large commercial city, from the mouth of the Ohio to New-Orleans, Memphis is situated just below the mouth of Wolf river, and contains a population of about three thousand. A new city about two miles below, at old *Fort Pickering*, is being laid out, called GIRARD, to which a branch of our road will be carried. *Girard* is about half way between the mouths of *Wolf* and *Nonconnah*, at the terminus of Nonconnah Ridge, extending east 25 miles, and on which the railroad runs.

LAGRANGE, is a beautiful town, containing about 1500 inhabtants. In fact the whole route to Charleston will be an exceedingly interesting one.

To the Editors of the Rail Road Journal.

METHODS OF LOCATION FOR RAILWAY ENGINEERS. BY S. MIFFLIN, CIVIL ENGINEER. PHILADELPHIA.

GENTLEMEN: I take great pleasure in calling the attention of the profession, through the medium of your valuable journal, to the above admirable little work. The demonstrations of the different "Propositions" show an intimate acquaintance with Geometry; the "Applications" show the experienced engineer; and the language in which they are conveyed to the reader, shows that the author possesses those acquirements, without which engineering is not a liberal profession, and, without which, no engineer will ever command the confidence of the accomplished and distinguished gentleman entrusted with the direction of many of our public works—I am sorry I cannot say, with all. The demonstrations are strictly geometrical, and the applications of the different problems most clearly explained. It is also, to the best of my knowledge, the first *practical* work on Railway Engineering.

With due deference to the care and labor which have evidently been bestowed on this work, I would suggest that between the 5th and 6th Propositions there should be introduced the general problem—to find the radius required to join 2 straight lines or tangents, the angle they form and the origin of the curve being given, or, to find the origin, the radius, and the angle formed by the lines being given. It appears to me that this is required to render the work complete. There are also half a dozen errors in the letters referring to the figures.

How does it happen that the publishers of this work and of that of Professor Mahan do not advertise in the Rail Road Journal, by which they would *sell* more copies than by advertising in all the other journals of the union.

Both works may be had at the Messrs. Carvills.

Your obedient servant,

New-York, 15th August, 1837. Q.

RAILROAD ACCIDENTS.—The following account of a recent accident on the Roanoke Railroad should arouse the attention of the traveling community. Accidents on Railroads are too common. Those persons having charge of Locomotives should be held to a strict account by the proper authorities.

Correspondence of the Baltimore Patriot.

Steamboat Columbus, August 12th, 1837.

The most serious accident that has occurred in Eastern Virginia since my recollection, happened on the Porthsmouth and Roanoke Railroad, one and a half miles from Suffolk, yesterday, between 9 and 10 o'clock. A company consisting of about 150 ladies and gentlemen, from the counties of Isle of Wight, Nansemont and Southampton, came down on the railroad on Thursday, the 10th inst., with the view of visiting Porthsmouth, Norfolk, Fortress Monroe, and returning the next day—on their return, at the time and place above mentioned, they met a locomotive and train of burthen cars, and horrible to relate, the two ran together while going at the rate of 10 or 12 miles an hour.

A messenger was sent into Suffolk for some physician in the place to come out immediately, and I being accidentally in that town, repaired to the place of accident, with the hope of being able to render some assistance to the wounded.

The most heart rending scene presenting itself that I have ever witnessed; every spot on both sides of the road, which offered the least protection from the sun, was covered with the dead dying and wounded. Three young ladies sitting together on the front seat of the second car were killed, neither living longer than fifteen minutes: another lady, an infant and a negro girl were so much injured, that they died before three o'clock, and

ten or fifteen ladies and gentlemen besides, sustained injury of one kind or another, very likely to prove fatal to four or five of them.—The confusion attending an accident where so many were present, the mangled corpses laid out on the side of the road, he mourns of the wounded and the weeping and wailing of relations, presenting a spectacle which defies description. Every possible attention was paid the sufferers by the Physicians and hospitable citizens of Suffolk, but the situation where it happened and the excessive heat of the day, added greatly to the intensity of their sufferings—I shall not attempt to assign any cause for this painful occurrence, as the matter will probably undergo a thorough investigation before a Court of Justice.

AN EYE WITNESS.

The names of those killed immediately were, Miss M'Cluny, Miss Ely, and Miss Roberts.—The three that died afterwards were, Miss Holland, an infant name not known, and a female negro slave 8 years old.—Those injured seriously are Mr. Wiley Watkins, two Messrs. Hollands, Mrs. Ely, Miss M'Cluny, Mrs. Holland, Mr. Phelts and others, names not known.

Major McNeill, the Chief Engineer of the Charleston and Ohio Railroad, arrived in Lexington, July 29th. The Knoxville Register says, from a personal reconnoisance of the route of the road thus far, Major McNeill finds the difficulties much less than he had expected, and entertains no doubt of the entire practicability of constructing the improvement for the estimated costs.

From the Philadelphia United States Gazette.

LOCOMOTIVE ENGINE.—Mr. Chandler—In your paper of to day, Messrs. Garret & Eastwick, by implication, deny that they have violated my patent right for an eight wheeled locomotive, and allege that there is a difference in the plan of their engine and mine. It is my duty to notice this, that no misapprehension in the public mind may exist.

There is not a shade of difference in the *principle*, which it is the object of the patent right to secure, of my eight wheel engine and that of Messrs. G. & E. they are in that respect identical. I had thought that this was perfectly understood by Messrs. G. & E. because both these gentlemen at different times, enquired of me the terms on which I would permit the construction of this species of engine. The controversy however, cannot be settled by newspaper correspondence, and I shall not trouble you again, my sole object being to place before the public my allegations to the facts. Their proof I shall furnish in a court of justice, to which I shall resort in order to obtain redress for the injury which I have sustained.

Yours, respectfully,

H. R. CAMPBELL.

Philadelphia, August 11, 1837.

RAILROAD IMPROVEMENTS.—A locomotive engine of eight wheels, made for the Beaver Meadow Company, was tried last week on their road. She took a train of cars, 52 in number, loaded with 140 tons of coal, down the road from Black Creek, branch of the Quakake, to Parryville, on the Lehigh, a distance of 20 miles, 5 of which lie along the Quakake Valley, on a grade of 250 miles, part of which rises to 95 feet to a mile.—15 miles along the Lehigh river average about 90 feet to a mile. The descent was no way surprising, as the road is all the way descending. But the return shows the improvement in this new motive power. Besides her own weight and that of her tender, (together about 10 tons,) she drew up the road 52 empty cars, weighing about 60 tons, until she reached the 95 feet grade, in a curve: here she detached 22 cars from her train, and with the remaining 30 started anew, and carried them through this heavy grade. The return with 52 cars along the Lehigh was quite easy, the grade not averaging over 20 feet to a mile.

By this experiment, the doctrine heretofore pretty currently established, that railroads cannot compete with canals for heavy transportation, is exploded. The average descent of most of our rivers (if no other sites can be found) present sites for railroads which can with such engines be made to compete successfully with canals of any size. Besides, the most satisfactory proof was presented by this engine, of the complete success of raising and keeping up steam by the use of anthracite coal, for fuel: the doors of the furnace having been, during this experiment, kept open half the time.

It is but just, in publishing these facts, to state, that the public is indebted to Messrs. Garrett & Eastwich, of this city, for this improvement in locomotive power.—[U. S. Gaz.]

The new and improved Locomotive for the Morris and Essex (N. J.) railroad, constructed by Mr. Seth Boyden, of Newark, goes at the rate of 60 to 70 miles an hour. The passengers are wholly protected from the fire of the chimney, the sparks, according to the Morristown Jerseyman, being taken to the ash dan beneath

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RAILROAD STATISTICS.—The number of proposed railways, including diversions, extensions, and branches in England and Wales, for which plans have been lodged in the private bill office in the present session, is seventy-five, of which only forty-eight are under the consideration of Parliament; these amount in length to twelve hundred and thirty-three miles, and are estimated at the sum of nineteen million three hundred and fifty-two thousand pounds, or fifteen thousand six hundred pounds per mile. The whole length of tunnelling is twenty-five miles; and the number of bridges, exclusive of viaducts and culverts, two thousand eight hundred and twenty-five, or nearly two and a third per mile. The weight of iron required for the rails is one hundred and ninety-three thousand tons; and of stones for the blocks, two million six hundred and seventy thousand tons. The area of land required to be taken up is upwards of fifteen thousand acres; and of felt for the chairs, one hundred and thirty acres. These railways, if carried into execution, would employ at least five thousand men and fifteen hundred horses for three years, for the earth works alone.

ROTTING OF TIMBER IN CERTAIN SITUATIONS.—Extract of a letter to the editor, from Mr. D. Tomlinson of Schenectady, N. Y., dated April 4, 1836.—In the year 1801, I built a warehouse on my lot in Union Street in Schenectady. The cellar was dug about four feet deep, and the stone wall a foot or two deeper. I left no opening in the walls for door or window. The floor beams were of excellent pitch pine timber of twelve by twelve inches, slit, and were six by twelve inches when placed in the wall, and about eighteen inches above the ground. I laid a floor of three inch oak plank, loose, neither jointed nor nailed, although they were square edge, and lay close to each other. Five years thereafter, I observed a jostling in a place in the floor, and raised one of the planks to learn the cause, and found one of the six by twelve inch beams rotted off and fallen on the bottom of the cellar. The plank was rotten below, except about an inch sound on the upper side. I lifted the whole floor, found most of the planks rotten, except a shell on the top; and the timbers were rotten, and so decayed, that I took them out and put in oak, after making windows and a door in opposite sides of the wall. I thought the depth of the cellar would have prevented injury to the timber, but found it the cause of the destruction, as fine shavings and slivers lying on the bottom of the cellar, were perfectly sound, while the timbers were beautifully ornamented with curtains of white mold, hanging in festoons, nearly the depth of the cellar, as white as snow, very thick, and appeared like bleached muslin.

In the year 1817, I took down an old kitchen on the same lot. The floor had lain on saplings of about 6 by 8 inches, such as are used for scaffold poles. They were bedded in the ground, so that the pine floor came next the ground, and excluded air. They had lain there from 1794, and both the timbers and flooring were very little injured by rot.

I concluded, that a free circulation of air must be allowed, or air must be entirely excluded, to save timber from decay.

It has been found, that when posts are set in the ground and cased with boards for better appearance, the confined air destroys them. Even red cedar, which lasts an age when set open, if cased, which is often done for ornament in gate posts, decays as soon as any other wood, by the confined air.

ŒNANTHIC ETHER.—The œnanthic ether may be deprived of any free acid it may contain, by agitation with a hot solution

of carbonate of soda, and subsequently boiling the mixture; the ether rises to the surface and may be readily removed. The small quantity of water or alcohol which it still retains, may be separated by means of the chlorid of calcium. The ether thus purified, is very fluid, similar to the essential oil of mustard. It is colorless, has an extremely strong odor of wine, which when respired is almost intoxicating. Its taste is very strong and disagreeable. It dissolves readily in ether and alcohol, even when the latter is quite dilute; yet it is not sensibly soluble in water. Its density is 0.862 and it is but slightly volatile. It boils between 225° and 230° C.

In three analyses, MM. Liebig and Pelouze obtained the following results,—

Carbon, -	71.815	72.50	72.02
Hydrogen, -	11.844	11.86	12.05
Oxygen, -	16.341	15.64	15.93

which correspond very nearly with the formula $C^{18} H^{36} O^3$. The œnanthic ether is readily decomposed by the caustic alkalies. With potassa, it affords a very soluble compound, consisting of œnanthic acid and potassa. When this salt is decomposed by sulphuric acid, the œnanthic acid forms an oily bed on the surface of the liquid.

Œnanthic Acid.—This acid presents a butter-like consistence at a temperature of 13.2 C. and is of a white color; at a higher temperature it melts and forms a colorless, inodorous oil, which reddens turnsol and unites readily with the caustic alkalies and alkaline carbonates. The œnanthate of potash, is a pasty mass composed of extremely fine fibres, which present a silky lustre after desiccation. From the composition of the œnanthates of lead and silver, the author infers that 2 atoms of base saturate 3 of acid.

In three analyses, MM. L. and P. obtained for the hydrated acid;

Carbon, - -	69 28	69.74	68.59
Hydrogen, -	11.54	"	11.56
Oxygen, - -	19.18	"	19.85

which lead to the formula, $C^{14} H^{28} O^3$. The anhydrous acid afforded carbon 74.32, hydrogen 12.2, oxygen 13.58, which corresponds with the formula $C^{14} H^{26} O^2$. It may hence be inferred that œnanthic ether is composed of œnanthic acid united to common ether, as is represented in the formula $C^{14} H^{26} O^2 + C^4 H^{10} O$, in the construction of which and also in the pree ding deductions, Berzelius's atomic weights have been used.

Essential Oil of Potatoes, by M. Augustus Cahours, (L'Institut, No. 199.)—According to Dumas, the essential oil of potatoes is represented by the formula,-$C^{20} H^{24} O^2$. M. Cahours infers that this oil is a compound analagous to alcohol and spirit of wood, in consisting of a peculiar compound of carbon and hydrogen for its base, ($C^{20} H^{20}$,) united to two atoms of water. He cites the following experiments by himself as proof of the correctness of this view.

The oil treated with sulphuric acid, and subjected to a mild heat, yielded an acid containing the same carburetted hydrogen for base. This acid formed with bases soluble compounds, whose analogy with sulphovinates is incontestable. The salt of baryta, for example, contained $SO^3 Ba O + SO^3$, $C^{20} H^{20}$, $H^6 O^3$. If the oil is put in contact with iodine and phosphorus, an ethereal substance is disengaged, giving off a slightly alliaceous odor, which is similar in composition to hydriotic ether. With nitric acid and chlorine, it afforded products of analagous constitution.

OUTLINES OF
PRACTICAL MECHANICS.

II.

OF PRIME MOVERS.

1. *Of Weights.*

16. A weight may be made to give motion to a machine, by attaching it to a cord, which cord may pass over a wheel, or be coiled upon a barrel. As the descent of a weight thus employed has a continual tendency to acceleration, it is necessary that it should be regulated. A regulator well adapted to this purpose may be formed by placing leaves or plates of metal, in the direction of radii, upon a horizontal fly wheel. As the resistance of the air in which the fly wheel moves increases nearly in the ratio of the square of the velocity, the resistance to the motion of the leaves finally becomes so great as to counteract any further tendency to acceleration.

This apparatus does not furnish a perfect regulator, in as much as the density of the air is continually varying.

A better mode of regulating the motion of a descending weight is to be found in the pendulum.

A machine impelled by a weight and regulated by a pendulum is called a clock. Its structure will be explained in the proper place.

2. *Of Springs.*

17. A spring is a flat plate of steel, which bent from a position determined by its original structure, tends to return to its primitive form. The form in which springs are usually fashioned is that of a spiral coil, and such springs are usually enclosed in a cylinder or barrel. This barrel is adjusted around a fixed pin, to which the inner end of the spiral is attached; the opposite end is fastened to the barrel. The spring may be wound up, or caused to form an increased number of revolutions around the central pin, by turning the barrel. As soon as the force by which the spring is wound up is withdrawn, the spring tends to uncoil itself, and in doing so turns the barrel around.

The force with which a spring tends to uncoil itself is not constant, but is greatest at first and gradually diminishes, until the spring is uncoiled. If the spring were of equal elasticity throughout, its force would be always exactly proportioned to its distance from a state of rest.

The most frequent application of the spring to drive machinery, is in the case of the watch and chronometer.

3. *Of the Strength of Men and Animals.*

18. Animals may themselves be considered as machines, planned by the creator with consummate wisdom, and admirably adapted to the several states and circumstances in which they are destined to exist.

19. The prime mover in animals is their life, a force whose origin and action are to us inscrutable. This vital energy is made, by the exercise of the will or volition, to act in producing every variety of motion of which the animal is capable, but the manner in which this volition is transmitted, is also beyond the reach of our finite capacities. In obedience to the will, the muscles contract, or are allowed to lengthen, and the contractile force is applied to cause rigid parts of the animal frame to turn upon the joints. In vertebrated animals, the muscles enclose the rigid parts, which are called bones. In articulated animals, the muscles are enclosed within a jointed shell, to which they give motion.

20. Each several motion of a bone is produced by the joint operation of two muscles which act in opposition to each other, and are hence called antagonists. One of these acts in its contraction to bend the joint, and is called the flexor muscle; the other tends to straighten the joint, and is called the extensor.

By the united action of two or more pairs of antagonist muscles, and by the simultaneous operation of those which act upon different bones, every variety of position and attitude, of which an animal is capable, is produced.

21. The muscles which give motion to the limbs are inserted in the trunk itself, or in limbs more near to the trunk than the parts they are intended to move. These muscles are inserted into the limbs to which they give motion, at no great distance from the joint. Hence each separate bone, when moving around the joint as a fixed point, becomes a lever of the kind ranked by mechanics as the third class. But when the extremity of the limb is pressed against an obstacle, and the muscles act to raise the joint, the arrangement becomes a lever of the second class.

In levers of the third class velocity is gained at the expense of power. But this loss of power is in no case attended with evil consequences, for the contractile power of the muscles is in all cases adequate to the exigencies which the habits of the animal demand. On the otherh and, great benefit is derived from the superior degree of agility which is thus conferred, and there are many cases where the mechanical action, or useful effect, is to be

measured by the square of the velocity instead of by the velocity simply, and in all these cases a lever of the third class is required for the most advantageous exertion of the strength of the muscles. The foot of man on the other hand is a lever of the second class, and is thus calculated to raise a great weight to a small height by by a comparatively small force. The muscles which perform this office, are much stronger in proportion than in any other animal, and, accumulated in the calf of the leg, add not a little to the beauty of the human figure. Man is thus enabled easily to maintain and move in that erect posture for which all the rest of his structure is fitted. This posture cannot be assumed by the animals which in other respects approach most nearly to the human structure. In these the muscles which form the calf of the leg in man, are slender and comparatively weak; thus, what in man is a firm support becomes in them a hand. These animals are hence styled Quadrumana or four-handed.

21. The erect posture in man is not assumed or maintained without effort. The flexor muscles of the limbs are shorter than the extensors, and thus, the position of the joints, when volition ceases, as in sleep or death, is slightly bent. At the instant of dropping asleep, the muscles before in action relax, and if a constrained posture have been assumed in preparing for repose, a sensation is felt similar to that of a fall.

The exertion required to maintain the erect posture is so great that the muscles which concur in this effect, have frequent need of repose; this is obtained by resting the weight, unequally on the two feet, and shifting it alternately from one to the other

22. In most quadrupeds, the relation between the lengths of the flexor and extensor muscles is the same as in man, and thus, when volition ceases, the joints bend, and the position of standing cannot be assumed or maintained without effort. The elephant is an exception to this rule. His great weight would demand a vast exertion of strength to support it, were the usual relation of the flexors and extensors preserved. But in this large animal their relative lengths are much more near to equality, and the leg, when volition ceases, takes the form of a straight column. Hence this animal can sleep without lying down.

23. Birds have the power of walking upon two feet, of standing upon but one, and of clinging to a perch during sleep, or even after death. These powers are given by an exactly opposite arrangement to that found in the elephant. The difference in the length of the extensor and flexor muscles of the foot is much greater than in any of the mammalia. In consequence of this, the position of the talons, when the muscles are not exerted, is that of the greatest curvature. In moving the foot, the action of the muscles spreads the toes, and they are set upon the ground in their most extended position. The subsequent repose of the muscles tends to draw the claws together, but this tendency is counteracted by the weight of the bird, the talons are thus firmly fixed upon the ground, and their position is the more firm, the less the will of the bird is exerted. Birds therefore may sleep resting upon one or both feet.

In birds which perch when they sleep, the tendons which bend the toes are the prolongations of muscles near the body. These tendons therefore pass over the intervening joints, so that when teese joints are bent, the tendons are put to the stretch, and close the foot mechanically.

24. In the progressive motion of animals over the ground the useful effect of the muscular force may be resolved into two parts. By the first of these the whole weight of the animal, and consequently its centre of gravity, is raised a small distance at each step. By the second, the centre of gravity is pressed forward until its line of direction falls within a new base, provided by the forward motion of the limbs.

The first of these motions is performed in man with great ease, in consequence of the mechanical property of the foot which has been mentioned, and the strength of the muscles of the calf of the leg. The second of these motions is performed with the necessary rapidity, because all the other limbs as we have already stated are levers of the third class,

25. When a man resting equally on both feet wishes to walk, the body is swayed towards one side until the weight rests wholly upon one of the feet, the other foot is then lifted from the ground and carried forwards, until a step of the usual length is taken and the foot again reaches the ground. While this motion is performing by the foot and leg, the other leg is slightly bent; and the muscles of the calf are applied to raise the centre of gravity to a small height, at the same time these with other muscles are employed to throw the body diagonally forward, until the weight rests upon the foot which has been in motion, and is just set down. The foot which had remained fast during the first step, is now raised from the ground, and a similar operation repeated until it is planted and the weight of the body rests upon it. In running, the foot whence the motion is performed is raised from the ground by a powerful exertion of the muscles before the other foot is set down. In walking therefore, both feet are upon the ground together at the beginning and end of each step, and one of them is always resting upon it, while in running the feet strike the ground alternately, and the body is in the interval thrown into the air.

26. A horse, or other quadruped, when about to move, leans forward, his feet are then raised in succession. In walking, one of the fore feet, say the right, is first lifted and thrown forward, the left hind leg is lifted soon after. A short interval then follows, after which the left fore leg is raised and almost immediately followed by the right hind leg. In trotting, two diagonally opposite feet are raised at the same instant of time, and after they reach the ground together, the remaining two feet are raised at the same moment. In racking, the body is swayed from side to side during the progressive motion, as in the walk of man; the two right feet are raised in quick succession, and are followed, after they reach the ground by the two left feet.

In galloping, the feet are taken up one by one, but the right fore leg follows the left fore leg at a short interval; the right hind leg moves next, and is immediately followed by the left hind leg.

27. The motion of birds through the air, or flying, is performed by the action of the wings upon the air. These are kept in action by means of powerful muscles situated upon the breast of the bird, and which are hence called *pectoral*. By the action of these powerful muscles a rapid oscillation is given to the wings. Although the velocity of this motion is equal in both directions, yet as the wing is convex above, and concave below, it is much more resisted in the downward than in the upward stroke, the result of the motions, therefore, is to raise the bird. During the downward stroke, also, the great feathers which compose the wing strike the air directly, and close upon each other so as to form a continuous surface; while, during the upward stroke they meet the air obliquely, or rather by an edge, and the air has a free passage between them. The direction of these motions is inclined, and thus the downward stroke is not only efficient in supporting the bird, but in giving it a progressive motion. The breathing apparatus of birds is so constructed that the air they respire may be passed through the quills and other tubes of the feathers. By this circulation of air, the density of the bird is materially lessened, and may be supported by a less exertion of force,

In the bat, whose skeleton approaches closely in structure to that of man, the wings are membranes spread upon the hind legs and the fingers or toes of the arms or forelegs. Motion is given to the latter of these by strong pectoral muscles, as in birds. In comparing the structure of this animal with that of man, it will be at once seen that the latter has not the power of flying, even with artificial wings, in consequence of a want of strength in the pectoral muscles. We may also see how monstrous and unnatural are the figures intended to represent angels, in which the wings are set upon the shoulders. The flight of birds is directed upwards, downwards, or horizontally by the feathers of the tribe.

The obliquity of the stroke of the wings differs in different birds, and is expressly adapted to their mode of life. It is greatest in birds of prey, which are consequently better formed for horizontal progressive motion; and is least in birds which rise to great heights in a direction nearly vertical.

28. Fish which live in a dense medium, have bodies whose mean density is the same as that of the fluid. In order to cause their ascent and descent, they are furnished with a bladder filled with air, and acted upon by muscles. When the air bladder is compressed by these muscles, the fish becomes denser than water and sinks; when the action of the muscles ceases, the bladder delutes, the fish becomes less dense than the water and rises.

The air bladder is situated in the lower part of the body of the fish, which therefore tends to be easily overturned. This tendency is prevented by two fins situated on the breast. These pectoral fins are moved by muscles of little strength, and have little ef-

fect in giving progressive motion. For the latter the tail is the important instrument, by an action resembling that by which u boat is sculled. In this important motion the greater part of the muscular matter of the fish concurs, and the two muscles of each pair are equal in length, so that under circumstances of rest the body of the fish remains straight. The tail itself is a large fin, whose curvature is altered by muscles, so that it may strike tho water under the circumstances best adapted for progressive motion.

29. The force of men and animals may be estimated in the weight they are capable of raising through a given height in a given time. Each individual animal will have a different degree of strength, but in those of the same species the comparison may be direct, and the average strength of a number of individuals may be used to express that of each. In comparing the strength of men with that of animals, or the strength of different species with each other, they must be considered as applied to do the same kind of work. The work which animals are most frequently caused to perform is that of draught. In estimating this the animal is supposed to move forwards upon a level surface, and draw a cord to which a weight is attached, and that the weight is drawn vertically upwards, as might happen, in consequence of the cord being passed over a fixed pully. Man may also be supposed to work in the same manner, and thus their respective strength may be compared.

30. Animals and men are capable of exerting a great degree of strength when impelled by a sudden impulse, and of moving for a short time with great velocities; but such sudden and violent exertions are followed by fatique and exhaustion. In estimating the force of animals, it is therefore necessary to take into account the number of hours per day during which an animal can work, without losing the power of recruiting his strength in the intervals of labor; and the number of days per year for which such work can be performed. The maximum or greatest speed, then, is to be taken, not as that which can be reached for a short space of time, but as that which can be kept up for the number of working hours in a day; and for the maximum resistance, we are, in like manner, to take that which can be strained against, but not lifted, in working the same number of hours.

The greatest force of draught which a man can exert is taken at 70 lbs., his greatest velocity in walking at six feet per second, or a little more than four miles per hour. By the principle of §. 11, a man works to greatest advantage in draught, to raise a weight to 31⅓ lbs. with a velocity of two feet per second. This is equivalent to raising 4120 lbs., through the space of one foot, in a minute.

The utmost strength of a horse in draught has been estimated at 420 lbs.; his utmost velocity in walking at ten feet per second, he will therefore work to the greatest advantage in draught in raising 186⅔ lbs., with a velocity of 3⅓ feet per second. This is equivalent to raising 36,933 lbs. 1 foot high per minute.

A man may work at his most advantageous speed for ten hours per day, for several successive days; a horse cannot work more than eight; but in both instances, days of rest must be allowed from time to time, in order to prevent a prostration of strength. One day of rest in every seven is found sufficient to restore the strength of animals and men working against resistances having the foregoing maximum measure, which fewer will not answer the purpose, hence the institution of the Sabbath is one of absolute necessity to the well-being of mankind and the animals it has domesticated.

Taking into view the difference of the number of hours each can advantageously work per day, the strength of a horse applied to draught is usually estimated as equal to that of seven men.

The strength of a horse is often used under the name of a horse power, as the unit in which the force of other natural agents is estimated. This unit has been sometimes taken as low as 28,000 lbs., sometimes as high as 44,000 lbs. each supposed to be raised one foot per minute. The estimate of this unit which we shall employ is 33,000 lbs. raised one foot per minute.

31. Draught is by no means the most advantageous mode of exerting human strength; in fact there is no mode in which he can be applied to that purpose in which he can do more than he can by the exertion of his arms and hands. But in bearing burthens, the relation between the strength of a man and that of a horse becomes greater than ⅐. The force of the former applied to draught is limited to seventy pounds, which he can move under any weight less than twice his own. Even when loaded with a weight bearing to his own the relation ¼, he can mount vertically upwards, as upon a ladder, and with a speed of 2 feet per second. A horse on the other hand supports less weight on his back than he is capable of drawing, and cannot carry even his own weight up a plane inclined more than 45° to the horizon.

Men may carry weights nearly equal to their maximum force of draught, and move under them with considerable speed. Thus a Roman soldier bore in his arms provisions and equipments, 60 Roman pounds, and performed journies at the rate of five miles per hour. A French Grenadier is loaded with 56 French pounds and marches at the rate of three miles per hour. The weights which are born by persons habituated to that species of labor are very remarkable, the most signal instances of this application of strength are to be found in the porters of Constantinople and Bagdad, the Gallegos of Lisbon, and the coal heavers of London.

4. *Of Water.*

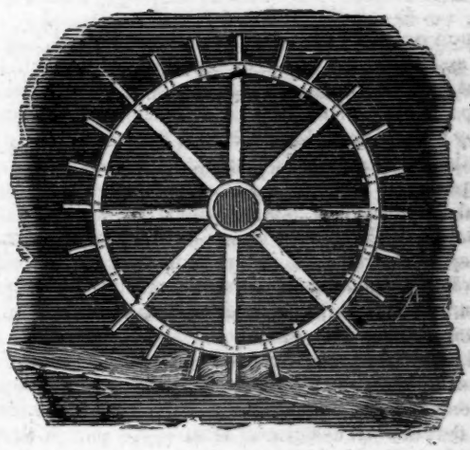
32. Water may give a circular motion to a machine in three ways: by its impulse; by its weight; and by its reaction.

33. The apparatus on which water acts by its impulse to produce a circular motion is called an undershot wheel.

An undershot wheel is suspended upon a horizontal axis, and in its usual form has upon its circumference a number of floats or paddles, whose planes pass through the axis, and which dip, in the lower part of their revolution, into a current of water. This form is represented beneath. (See Fig. 10.)

34. An undershot wheel may be loaded with such a weight as will prevent it from turning, or, were there no resistance, might acquire the whole velocity of the stream, in neither case

Fig. 10.



could it do any work. Its greatest or maximum effect is produced when its velocity is ⅔ths of that of the stream. This fact was first discovered in the experiments of Smeaton, and has since been shown to be consistent with theory. It is also inferred from theory that at this velocity of ⅔ths, the useful effect of the wheel would be to raise one third of the weight of the water which forms the current, to the height whence it must have fallen to acquire its velocity, or in other words, one third of the mechanical measure of the action of the water. This last inference is found to vary from the truth in different modes of placing the floats upon the wheel.

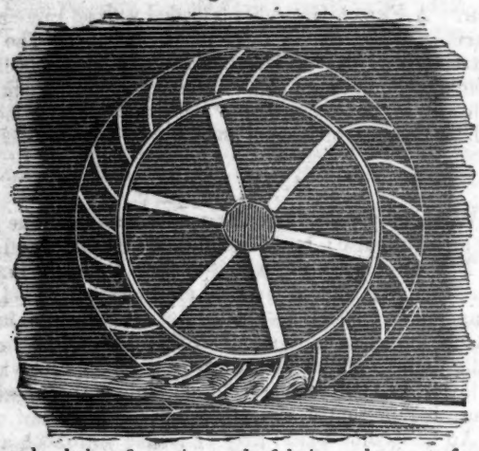
35. When the action of undershot wheels was first considered scientifically, it was inferred, that in order that the water should act most advantageously, no float should interfere with the flow of the current upon another. To fullfil this condition, when the lower float is vertical, the preceding float should be just quitting, and the succeeding float just entering the water. Constructed in conformity with this condition, the best effect was found to be little more than one fourth of the mechanical measure of the action of the water. Smeaton in his experiments found that the most advantageous position of the floats was such, that, when one bucket was vertical, two others should be immersed in the water, a fourth entering and a fifth emerging from it. In the former case no more than two floats can be in the water the same time; in the last case there may be

four. With the latter construction the effect of the wheel becomes three-tenths of the mechanical measure of the action of the water.

36. A further increase in useful effect may be gained by closing up the face of the wheel, and applying flaunches or edges to the two vertical sides of the float; the useful effect then becomes $\frac{3.6}{10.0}$ of the mechanical measure of the action of the water.

37. A still better arrangement is that proposed by Poncelet, and represented beneath.

Fig. 11.



In this wheel the floats instead of being plane surfaces are are curved into the form of a portion of a cylinder. By this arrangement the force of an undershot wheel has been doubled

To be Continued.

THE ODOR OF WINES DUE TO A PECULIAR ETHER. By MM. J. Liebig and Pelouze. (Ann. de Ch. et de Phys. Oct. 1836.) It is a fact of common observation, that a bottle containing but a few drops of wine, gives off a peculiar odor, which cannot be imitated by mixing alcohol and water in the proportions in which they exist in the wine. This characteristic odor, which is more or less apparent in all wines, is produced, according to MM. Liebig and Pelouze, by a fluid possessing all the characters of an essential oil. The flower, aroma, or *bouquet of wine*, as it is more especially called, is produced by a substance which is inodorous, and should not be confounded with the subject of these remarks; it is not volatile, is different in the several kinds of wine, and in many fails entirely.

This oil may be obtained by distilling large quantities of wine, or the lees of wine, or especially from the product deposited after fermentation has commenced. From the results obtained they infer that this oil constitutes abou $\frac{1}{40000}$ part of the wine. The oil as thus obtained, before purification, has a strong odor, and is generally colorless. Occasionally it presents a slightly greenish tint, derived from the presence of a small quantity of copper, as is proved by reagents; this color may be removed by distillation.

The constitution of this product, though it contains a considerable quantity of oxygen, is quite different from that of the oxygenated essential oils heretofore known. It proves to be a peculiar ether containing an acid allied to the fatty acids. This new acid is called by its discoverers, *œnanthic acid*, and the ether, consequently, *œnanthic ether*.

From the American Journal of Science and Arts, for July.

INTERLOCKING OF BEECH TREES.—On the farm of Colonel the Geo. Warner, in the southwest part of Stockbridge, Mass., is following curious interlocking of two trees of the common *beech*, *fagus ferruginea*. They grew on the side of a hill near the bank of the Housatonic River, where the passage of the river around and through the north part of Monument Mt. presents very beautiful scenery. The right hand tree, A, as you stand facing the north, is nine a half inches diameter at the base, while the left hand tree, B, which stood at the distance of eighteen inches from it and a little lower down the hill, is four and a half inches in diameter, and shows *forty-four concentric layers*. The limbs of the trees are peculiarly zigzag or tortuous. At the height of ten feet from the ground, a limb from B has become so entangled in the limbs of A, that the body of A has grown entirely over the limb, and so perfectly enclosed it that the limb appears to grow directly through it. The tree A is here five and a half inches in diameter, and the limb passes through it nearly in the middle from the center to the outside. The limb from B is two feet long to A, and one inch and a half in diameter where it enters A, but it is only one inch in diameter were it issues and then extends *ten feet*. The limb starts from B, about eleven feet from the ground. In the winter of 1836, the tree B was cut off for wood; but the farmer, finding it strongly entangled in the other tree and the weather being very cold, left it without ascertaining the reasons of its being held so firmly by A. In the summer he saw that the tree, though cut off and having turned round from the weight above so as to have its lower end about three feet from the ground, was flourishing with rich foliage; he ascertained the singular union of the two trees, and called the attention of the curious to the fact. When I saw the trees in September last, they were covered with large, full, bright leaves, the one equally with the other so far as the eye could ascertain from laying the leaves side by side. The trunk of B, which was cut off, had healed over at the lower extremity so as to be green with life quite to its end, and seemed to be as vigorous as the other. The trunk and limbs of B, extend twenty feet beyond the limb which unites the two trees

It is evident that it is the sap of A, which is elaborated in B, and is employed for its support. It is probable that the vessels in the part of the limb which unites the trees, and in which the sap originally ascended, are now used for the passage of the sap from A to B. In this case the vessels for the ascending sap perform their usual function through most of the uniting limb, and their action is inverted in the uniting part.

Rochester, N.Y., March 29, 1837.

AMERICAN JOURNAL OF SCIENCE AND ARTS.

The July No. of this valuable work contains several articles of high interest.

Prof. Hare has contributed several papers containing descriptions of apparatus devised by him. His article on the subject of Chemical Nomenclature does him great credit—his ingenious views are well defended, and in our opinion with entire success.

The articles of Dr. Zabies Rie and Dr. Page on Electro Magnetism, and of Messrs. Twining and Swain, on Meteorological Phenomena, show how much interest is excited in the various branches of Electrical Science.

The contributions of Dr. Shephard and others on Mineralogy and Geology are also valuable papers. Dr. S. gives the chemical examination and a general notice of two new minerals of highly interesting composition

Dr. Gale has an article on Zinc roofing in reply to the remarks of Prof. Caswell, upon a paper by Dr. G. published in our Journal last year. We give them to our readers.

We look upon this Journal with no small degree of pride; its contributors and its amiable editor would do honor to any country—we are pleased when we can point out living illustrations of the progress of science in our country—more especially when they are to be found in men who, instead of induiging in the common twaddle about "most congenial soil for the growth of science" "most favored country" "general intelligence" "most favorable form and administration of government" &c., &c., go to work in good earnest to make good use of such of those advantages as are real, and to overcome them when they exist as obstacles, instead of advantages.

From the American Jonrnal of Science and Arts.

ON ZINC ROOFING; BY PROF. L. D. GALE, OF THE NEW-YORK UNIVERSITY. READ BEFORE THE MECHANICS' INSTITUTE, JUNE 6, 1837.

Sir—The following remarks are intended as a reply to a paper by my friend Prof. Caswell, of Brown University, and which ap-

peared in the 31st volume of this Journal. In March, 1836, I published in the Mechanics' Magazine of this city, (New-York,) some remarks on zinc as a roofing material, substituted for slate, copper, tin or tiles, in which I stated the bad results that had followed the experiments made on zinc in this city, and pointed out the defects of that metal. Parts of that paper were copied into the newspapers of the day, from which I suppose Prof. C. obtained his idea of its correctness, inasmuch as he has both misconceived and misquoted my paper. In the present remarks I shall first state the positons taken in my former paper, and then proceed to give the details of my experiments, and let others who may be disposed to read the article draw their own conclusions.

Prof. Caswell commences the argument in his paper on the three following subjects, *supposed* to have been the divisions of my paper in the Mechanics' Magazine.

1. Difficulty of making the roof tight.
2. Deterioration of the water which falls from it.
3. Comparatively small resistance which it offers to the progress of fire.

My own division, however, is quite another thing; it is the following. Zinc is objectionable, (as a roofing,) First, from the great expansive power of the metal. Secondly, its brittleness. Thirdly, it deteriorates the water.

As Prof. C. has embraced my threefold division under two heads, namely, tightness of roofs, and deterioration of the water, I shall make a few remarks on each of these. As his third division has no place in the original paper in question, it need absorb no time in this.

On the difficulty of making zinc roofs tight Prof. C. states, "There is no practical difficulty in making a zinc roof *perfectly tight*," and this is proved he says "by numerous certificates that place the subject beyond all reasonable doubt. A zinc roof may as easily be made tight as any other. There may be sheet zinc in the market of a bad quality, but none need be deceived on this point, since nothing is easier than to test its flexibility."

This is, it must be confessed, a pretty summary way of disposing of so important a matter. There is probably no place in the United States, where the experiment of zinc roofing has been so extensively tried as in this city. I think I can point out between seventy and one hundred buildings, to my personal knowledge, that have been covered with zinc, and in a very considerable portion of them it has been removed, and its place supplied by copper, tin, or slate; and those roofs that still remain, covered by zinc, I have ascertained by careful investigation, are more expensive to keep in repair than any other roofs whatever; and furthermore, I would say, that zinc is now almost entirely out of use in this city as a roofing material. Let me ask my friend Caswell, why most of our New-York builders, as well as the proprietors of buildings, have abandoned the use of zinc, if there be *no practical difficulty* in making a zinc roof *perfectly tight!* Has Messrs. Crocker and Brother's zinc not come to the New-York market? Has not "foreign zinc from the best manufactories" been imported and tried in this city? Yet all this avails nothing. So long as zinc retains the name and properties of zinc, it will continue to be a brittle metal, and though by heating it to a certain point, it may be rolled into thin flexible sheets, yet, after a few years, the metal may becomes nearly as brittle as it was before being wrought.—This fact is a prominent one, not confined to zinc only, but is common to most other metals; thus, malleable iron laid by for many years, becomes exceedingly brittle, from a tendency in the metal to assume the crystalline texture. I have observed fragments of sheet zinc laid by for a number of years, become so brittle that they would scarcely admit of bending without fracture. This seems to be a general principle, and I have little doubt that it forms one of the great difficulties in keeping zinc roofs in repair. Now if Prof. Caswell, and Messrs. Crocker, Brother & Co. have discovered that there is no difficulty in making zinc roofs *perfectly tight*, and that their zinc "will bear to be doubled and hammered down without any appearance of fracture in the bend," and that the same remark is true of their zinc generally, I would advise them to come to New-York and teach our builders how to make zinc roofs *tight*; for our workmen are unable to do it and consequently zinc has almost entirely gone out of use for such purposes in this city.

I did observe in my paper, that water drained from a zinc roof is deteriorated, and thus is injured, either for washing or for culinary operations. Now because the same properties are not noticed by Thomson, Berzelius, Brande or Turner, Prof. Caswell has very judiciously come to the conclusion, that such properties as I have attributed to zinc cannot exist; therefore, I must have been mistaken. He also says I have not stated very fully the reasons on which my opinion was founded, with regard to the oxidation of zinc on roofs and the solubility of the oxide so formed, and as a proof that I was mistaken he has exposed water from a zinc roof to the air in clean glass vessels for several days, without any appearance of a precipitate: he has also kept the water for several days in a vessel of oxygen gas, subjected to frequent agitation, without precipitation or appearance of milkiness. Hence, he says, "if such water contains the suboxide of zinc, its presence is not to be detected in this way." The conclusion from the above experiment is, I think, very just, but we shall see whether it will apply equally to my experiments, which I shall now give in detail. They were made with a zinc roof, one hundred and eighty feet by ninety, equal to sixteen thousand two hundred square feet, and repeated for three months, at every shower of rain, and the effects produced by alternate dryness and moisture upon the metal were carefully noted. I cannot go into great minuteness of detail, but only sufficient to show the method of experimenting and the result.

As soon as a shower of rain began to fall on the roof, some of the first water that ran was collected and found to have a strong metallic taste, and to decompose soap. The water was set aside and allowed to remain at rest for some weeks, when a fine light yellowish sediment was found on the bottom. This effect was remarkably evident in the cistern, where the metal was precipitated from a large body of water. The sediment was carefully examined, and found to be oxide of zinc. In many cases no sediment was obtained from water that was examined, though collected in the early stages of a rain; so that no good results could be expected from a single experiment. The greatest amount of sediment was produced from a fall of snow, allowed to remain on the roof until removed by gradual thawing. The water drained from the roof under such circumstances was highly charged with metallic matter, which at length disappeared, and a sediment of oxide of zinc was found on the bottom of the vessel and the water left quite pure. Now as a metallic compound did exist in the water, and as that, at length, disappeared by exposure, and oxide of zinc was found deposited on the bottom of the vessel, I inferred that the soluble compound was a suboxide of zinc, and probably the one described by Berzelius. Since Prof. Caswell's paper has appeared, I have called on a number of builders and workers in metal, to ascertain whether and how far my expemriments and opinion, expressed in my paper in the Mechanics' Magazine, coincided with facts as they occur to the workmen, and I am happy to say that I have nothing to retract. The following corroboratory remarks are from the Albany Daily Advertiser.

"Zinc.—The experience of two winters has proved to our satisfaction, that this is a worthless material for covering the roofs of houses. It very soon becomes rotten, and, as it is put on, affords very little protection against rain or snow. Tin or slate will be found far preferable."

In conclusion, I will again say, if zinc is a valuable material for roofs, which can easily be made tight, why is it that the article is going out of use as fast as possible? Why is it that no new zinc roofs are furnished in this great metropolis? It may be said, that they have used a bad article. But, I repeat, does not Crocker & Brother's zinc, does not the best foreign article, come to the New-York market? Where have purchasers a better opportunity of selecting good zinc, where have builders a better opportunity of experimenting and ascertaining the best material for roofing? Is it probable that men who have gone deeply into the business of roofing with zinc, would readily abandon it, if they could sustain it? Would proprietors sustain the expense of tearing off the zinc and substituting some other material, if there were any other better method of managing? Would they not first resort to the expedient of mending? This last question I can answer from personal knowledge, that mending of zinc roofs has in some cases been nearly equal in expense to half the first cost. I am quite satisfied, that if my friend, Prof. Caswell, will review the whole matter of zinc roofs, he will come to the conclusion that notwithstanding the superior products of Messrs. Crocker, Brother & Co. there are still difficulties in the use of zinc as a roofing material that are not entirely imaginary.

Concluded from page 525.

With regard to *gypsum and salt* we have nothing to add, except to repeat our recommendation of experiments on their effects.† Though quite aware of the common sentiment—"that gentlemen may use their superfluous cash for this purpose, but farmers have uses enough for their money in the regular routine of their business, and few are so over-burdened with capital as to afford the risk of its diminution by uncertain speculation"—yet we entreat them to reflect, that experiments may be tried with those two articles upon a single acre; that the expense, if unsuccessful, can only occasion the loss of a few shillings; but, if they succeed, may be productive of incalculable advantage.

Neither respecting the various *miscellaneous substances* which we have enumerated, have we any further observation to make upon their respective properties. The fluid or dissolved parts of animal matter require some preparatory process to fit them for manure, the great object being to blend them with the soil in a proper state of minute division; for when they have been applied in a rank or unreduced state, bad effects have followed. *Train oil, blubber*, and similar refuse, should therefore, be made into composts with a large body of earth.‡ *Rape and malt dust*, requiring no mixture, are very commonly laid upon the land as top-dressings—the difference between which and manure ploughed into the ground, is, that the former are applied chiefly with a view to the sole benefit of the immediate crop, without regard to the further improvement of the soil; though there can be no doubt that if the crop be increased, the soil will also feel their good effects. In this manner *soot* is also invariably used; but its fertilizing properties are solely referable to the ammonia contained in it, which is an active stimulant of vegetation. The practice of laying it upon land which has been limed, or of mixing it, as sometimes done, in composts with lime, is therefore injudicious.§

It has long been a disputed question, whether all plants extract the same nutritive juices from the soil, and convert them into he kind of sap adapted to their peculiar qualities, or whether each is nourished by a different substance. It would at first appear improbable that plants differing from each other in form, smell, taste and properties as food, should be produced by the same matter; yet, when we reflect that different plants deprive each other of nourishment, by extending their roots into the same soil in which various kinds are planted, we cannot but conclude that their first nutriment must be of the same nature, though the sap probably acquires different properties in its progress towards perfection. This, however, is one of the secrets of vegetation with which we are unacquainted; but as we also see that some soils are better adapted than others for the growth of particular kinds of grain and vegetables, and that those crops to which they appear the most favorable yet become deteriorated if repeated, even though regularly dressed with one species of manure, it seems evident that there must be some advantage in the change of manure, as well as in the system of cropping tillage land.‖ This will be gained by every farmer who has at his command manures of an unusual kind and who understands their use, for he may then adopt many plans of cropping which are out of the power of others not similarly situated, and vary his rotations according to circumstances of the moment, or to his own convenience.

We have already touched upon the properties of alkaline manures, so far as they have been tested by experience; the solution of the effects of acids upon the soil must be still left to future experiments, for those already made by chemists, in many instances, present different results. Whatever may be the food of plants—whether gasses, oils, salts, or acids—the farmer, however, need not puzzle himself about their chemical qualities, for he may either satisfy himself from the experience of other, or by small trials of his own, whether the effects of any particular species produce fertility or not. Farm-yard manure has been justly called "the farmer's magic wand;" and the oftener that wand is waved, the more will it contribute to his prosperity. He sees that wherever it has been judiciously used, it causes abundant crops, and that wherever it has been withheld, sterility seizes upon the soil; his chief efforts should, therefore, be directed to its increase.

Although the time and manner of applying every description of manures depend so much upon the nature of the soil and season as well as of the crops to be sown, that no precise rules can be laid down for their employment, yet the following general hints may be found useful.

Summary.

When manures of any kind are to be used as top-dressings for grass, the best season for that purpose is as early as practicable in the month of February, as the vernal showers will then wash them into the soil. If for arable land, at the same time the sowing of the seed, or immediately after; but if for wheat, when vegetation is about to acquire force, in the spring.

If dung be applied to a wheat crop, it should be ploughed in during the course of a summer-fallow; if compots, at the last ploughing before the seed furrow; but compost of lime and earth only, may be laid upon the land during any period of the year.

The land should be laid dry, and the manure should be equally and speedily spread over every part of it, in proportion to the nature of the soil; but if ploughed in, though it should be well mixed with the ground, it should not be too deeply buried.

The stronger and the colder soils are, the more manure they require, and, as such land is generally applied to the production of crops which do not speedily attain their full growth, the application of dung which has not been completely decomposed by the putrefactive process may be there admitted, for although the progress of vegetation may not be so rapidly forwarded, yet the manure will at length decay, and afford a more gradual degree of nutriment to the present, and greater support to the land for the production of future crops. On adhesive land, long manure from the farm-yard also acting mechanically, by keeping the soil open, is not so binding as short dung; but on dry, sandy, hot soils, the dung should, on the contrary, be perfectly decomposed, or rotten; and manure of any description should, on such land, be only laid on in moderate quantities at one time. One general observation may be made regarding all dissertations on manure, which is—that as there will be different gradations both of soils and the substance of which manures are composed, we can never speak but in general terms of their application.

The following table will explain how many heaps of manure—each containing an equal quantity of any given amount—are required to dress any field, per acre, at certain regular distances: so that, by calculating the solid contents of the manure in cubical yards, each containing 27 bushels, and dividing it by the number of heaps, the exact quantity to be laid on in each heap may be correctly ascertained:—

No. of heaps at	5 yds.	distance.	193 per acre.
"	5½	"	160 "
"	6	"	134 "
"	6½	"	114 "
"	7	"	98 "
"	7½	"	86 "
"	8	"	75 "

WHITE OAK AND POST OAK.

J. Seelye, of Sharon, Conn., inquires, first, what is the distinction between post oak and white oak, the former being esteemed, at the south, better and far more lasting, than the latter. And second, on what particular day in the year a tree, perforated by woodpeckers, or slightly girdled with an axe, will die. *While oak* is a tree of the first class as to magnitude, and grows in every part of the United States, though in Florida it is found only on the borders of the swamps. It is the only oak, on which

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instantaneous fallow.' Were this principle to be relied upon, it would follow that paring and burning might, within a few years afterwards, be advantageously repeated; whereas, experience proves that, with whatever benefit the operation may be attended with in the first instance, a repetition of it always found to impoverish the soil.—See Quarterly Journal of Agriculture, No. XXV.

† See Chapters xiv and xviii.

‡ "Tallow and oils received in a crude state by the roots, may clog the pores of the plant, repel the aqueous fluid, and obsrtuct the free communication of the leaves with the atmosphere."—Sir H. Davy's Lect. on Agric. Chem. 4to p. 112.

§ Hornby on Lime, p. 26.

‖ Sir H. Davy, Agric. Chem. 4to. p. 273. Doncaster Report on Bone Manure, p. 27. See also the recent "Theory of Rotation of Crops," by M. De Candolle.

a few of the dried leaves persist till the circulation is renewed in the spring. Of all the American oaks, this is the best and most generally used, according to Michaux, being strong, durable, and of large dimensions. The *post oak* resembles somewhat in foliage the white oak, though the lobes of the leaves are broader, and less pointed; and its acorns are not half so large as those of the white oak. The leaf of the white oak has three, and that of the post oak four lobes. This oak belongs to the second class of forest trees, its height rarely exceeding 40 feet. It is not found growing north of the neighborhood of the city of New York, bnt abounds in the middle states and in Florida. The wood is less elastic, though finer grained, and more durable than the white oak: hence it is preferred for posts, and is used with advantage by wheelwrights and coopers. As to the second point of inquiry, we are not aware that there is any *particular* day in the year, and we are sure there is not, when a tree will be killed by the pecking of birds. Trees either die by cutting off the supply of sap, which passes from the roots through the sap wood, or for want of elaborating organs—the leaves—which convert this sap into vegetable nutriment. Cutting through the entire sap wood, at any time in the early part of summer, so as to prevent the ascent of the sap, or divesting it entirely of the leaves, which elaborate this sap, in June, will seldom fail to kill the most hardy tree.

THE PRODUCTION OF GALVANIC MUSIC.—The following experiment was communicated by Dr. C. G. Page of Salem, Mass., in a recent letter to the editor. From the well known action upon masses of matter, when one of those masses is a magnet, and the other some conducting substance, transmitting a galvanic current, it might have been safely inferred (a priori,) that if this action were prevented by having both bodies permanently fixed, a molecular derangement would occur, whenever such a reciprocal action should be established or destroyed. This condition is fully proved by the following singular experiment. A long copper wire covered with cotton was wound tightly into a flat spiral. After making forty turns, the whole was firmly fixed by a smearing of common cement, and mounted vertically between two upright supports. The ends of the wire were then brought down into mercury cups, which were connected by copper wires with the cups on the battery, which was a single pair of zinc and lead plates, excited by sulphate of copper. When one of the connecting wires was lifted from its cup a bright spark and loud snap were produced. When one or both poles of a large horse shoe magnet, are brought by the side or put astride the spiral, but not touching it, a distinct ringing is heard in the magnet, as often as the battery connection with the spiral is made or broken by one of the wires. Thinking that the ringing sound might be produced by agitation or

REMARKS OF THE CONDUCTOR.

We have adverted to the subject of bone manure in our second and third volumes, and stated our mode of obtaining and preparing it. We have boen less urgent upon this matter, because we saw little hopes of our farmers regarding this source of fertility, while they remained reckless, as too many of them do, of their dung and other sources of fertility which abound on every farm. The subject shall receive our early attention. In mean time, in reply to Mr. Foote's questions, we answer, first—the time *has* come for every farmer to husband and apply to his lands, all the means of fertility at his command. Bone dust will not prove serviceable upon clays. It is applied at the rate of 20 to 40 bushels on an acre. Bone milis can only be profitably erected near navigable waters. Secondly—bones can be crushed in plaster mills, so as to answer well. Thirdly—bones that have been boiled are deemed as good as those which have not been boiled, and old bones nearly as good as fresh ones. And fourthly—not only potato tops, but sedge grass, weeds, straw, and every sort of vegetable matter, or earth abounding in it, as that from swamps, ditches, ponds, &c., leached ashes, soap suds, urine, &c., may all be profitably commingled in the dung yards, which should be made concave in the centre, in order to retain the liquids of the yard, and which these vegetable matters will absorb. And the yard should be thoroughly cleaned every spring, and the contents fed to hoed crops.

List of Subscribrrs to the Railroad Journal that have paid.—

J. W. Judson, Ashford, Conn.	July 1, 1838.
S. Bailey, Bolivar, Tenn.	March 1, 1838.
E. Morris, Lagrange, Tenn.	Jan. 1, 1839.
J. Noonan, Baltimore, Md.	Jan. 1, 1838.
N. B. Bufford, Frankfort, Ky.	July 1, 1837.
W. R. Hopkins, Chambly, S. C.	July 1, 1837.

Advertisements.

CROTON AQUEDUCT—NOTICE.

SEALED PROPOSALS will be received by the Water Commissioners of the city of New-York, until the 5th day of September next, at 9 o'clock, P. M., at their office in the city of New-York, for the Excavation, Embankment, Bank Filling, Foundation and Protection, Walls, Tunnels, several large and small culverts, and an Aqueduct of stone and brick masonry, with other incidental work on that portion of the Croton Aqueduct which is embraced in sections 9—10—12—13—14—16—19 and 21 to 26 inclusive on the 1st Division; and sections 27 to 53 inclusive, being the whole of the 2d Division.

The prices for the work must include the expense of materials necessary for the completion of the same, according to the plans and specifications that will be presented for examination, as hereinafter mentioned.

The work to be completed by the 1st day of October, 1840.

Security will be required for the performance of contracts—and propositions should be accompanied by the names of responsible persons, signifying their assent to become sureties. If the character and responsibilities of those proposing, and the sureties they shall offer, are not known to the Commissioners or Engineers, a certificate of good character, and the extent of their responibility, signed by the first judge or clerk of the county in which they severally reside, will be required.

No transfer of contracts will be recognized

The line of Aqueduct will be located, and the map and profile of the same, together with the plans and specifications of the materials and manner of construction, will be ready for examination at the office of the Engineer, at the village of Tarrytown, on the 19th instant, and the Chief or Resident Engineer will be in attendance to explain the plans, &c., and to furnish blank propositions.

Persons proposing for more work than they wish to contract for, must specify the quantity they desire to take.

The full names of all persons that are parties to any proposition, must be written out in the signature for the same.

The parties to the proposition which may be accepted, will be required to enter into contracts, immediately after the acceptance of the same.

The undersigned reserve to themselves the right to accept or reject proposals that may be offered for the whole or any part of the above described work, as they may consider the public interest to require.

New-York, August 8th, 1837.

STEPHEN ALLEN,
CHARLES DUSENBERRY,
SAUL ALLEY,
WILLIAM W. FOX,
THOMAS T. WOODRUFF,
} Water Commissioners.

JOHN B. JERVIS, Chief Engineer,
New-York Water Works.

3t—32

VICKSBURG AND JACKSON RAILROAD.—NOTICE TO CONTRACTORS.—Persons disposed to contract for and give personal attention to the laying of the superstructure for the Vicksburg and Jackson Railroad, about 45 miles in length, in the State of Mississippi, may receive all necessary information to enable them to propose by applying to the subscriber at the office of J. R. Van Rensselaer, Esq., 21 Wall Street, until the first of September next.

R. S. VAN RENSSELAER,
Engineer, V. & J. R.R.

New-York, 1st A 18ugust,37. t—32. 1st

TO RAILROAD CONTRACTORS.—Proposals will be received at the office of the Clinton and Port Hudson Railroad Company, in the town of Jackson, Louisiana, until the first of November next, for the completion of the balance of the Clinton and Port Hudson Railroad, being about 21 miles. Plans, profiles and specifications, giving all the necessary information, may be examined at the office of the Engineer in the town of Port Hudson.

A. G. THORN
Chief Engineer.

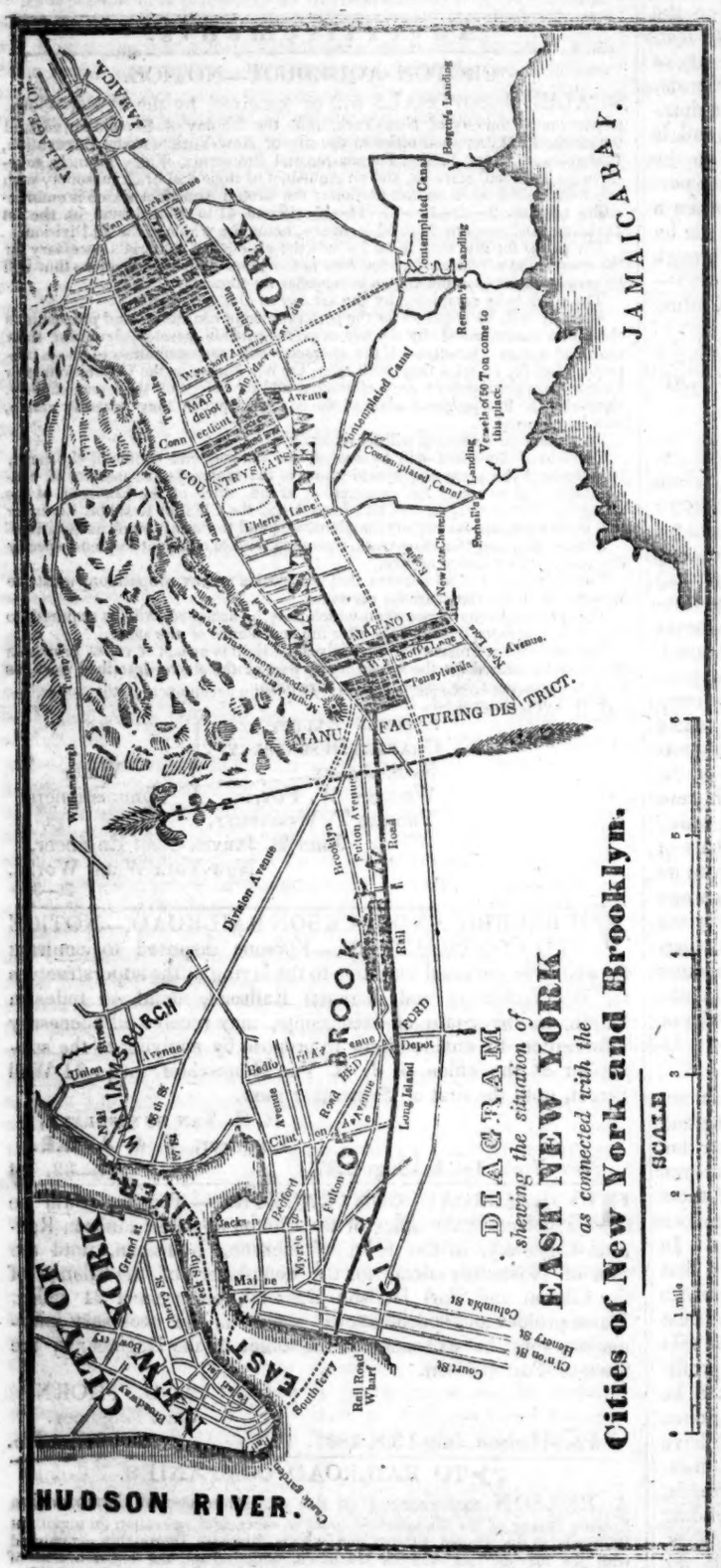
Port-Hudson, July 13th, 1837. t—32. 1st No.

☞TO RAILROAD COMPANIES.

A PERSON experienced in the construction of Locomotive Engines (many of his Manufacture being in successful operation on important Railroads in the United States) and who is likewise thoroughly acquainted with the management of such machines, and, indeed, the entire ordeal of Railroads, is desirous of obtaining the situation of General Superintendant on some Railroad, South or West.

The most satisfactory testimonials of character and capability can be produced. Communications addressed to the Editors of this Journal, stating the location of Road, &c. will meet with prompt attention.

9t—34



EAST NEW-YORK—LONG ISLAND.

TO MECHANICS, ARTISANS AND MANUFACTURERS:

More than three years have elapsed, since a project was first started to acquire by purchase, a considerable portion of the lands lying between Brooklyn and Jamaica on either side of the Long Island Railroad, with a view of establishing locations for business of every kind, and also for *permanent family residences*—to afford substantial accommodations to the various interests of the different classes of society, who may desire situations in the *immediate* neighborhood of the great metropolis of American Commerce, on very moderate terms—where may be enjoyed all the benefits of a residence in New-York, without the burden of her enormous city expenses.

Every thing anticipated in securing effectually the *choicest* of the lands, has been fully accomplished; also in maturing and adopting plans for their general improvement; and the proprietors feel warranted in saying, that in *no part* of the United States can there be found a more *eligible* section of country for the purposes intended. The present time is peculiarly adapted for the commencement of operations in East New-York, where all, however humble, may participate in, its rise and progress. The awful and unprecedented derangement in all mercantile pursuits, and the general prostration of commercial credit, cannot fail to affect more or less every interest. Thousands, who but a few months ago enjoyed the confidence of all, are now reduced to penury and want, and many yet above water, are so far crippled as to be unable to *afford* any *facilities* to the *manufacturer*. The pause and calm which at present exist, cannot last long—*new arrangements* and *modes of doing business must* ere long be the result of the present *revolutions* in trade—and these will doubtless be *based on moderate and economical* views. Extravagance and luxury have had their day. The humble, industrious man will seek to accomodate himself to the times; to provide the cheapest and safest location for his particular avocation. The extreme moderate rates at which pr perty may now be obtained, and the great reduction of building materials at this moment, cannot fail to reward richly those who first come into this enterprise. A very small sum now expended, will secure an indepencence—*a home—a place of business, almost within hail of the greatest market in America.* Any change in our general affairs, must have the effect to enhance the interest and promote the welfare of those who now become proprietors in East New-York.

That portion which is designated for mechanical and manufacturing operations, is now prepared to a considerable extent for the reception of such persons, as from their connexion with the above mentioned branches of industry, may be disposed to participate in the growth and business of this *now organized*, (and which may be JUSTLY CALLED) BEAUTIFUL MANUFACTURING DISTRICT.

The site selected for this object possesses many advantages, and it is intended by this communication to point out the *most prominent*.

1st. In its immediate proximity to the business and eastern part of the city of New-York, the city of Brooklyn, and village of Williamsburgh; through which latter places the great leading avenues are now *parmanently fixed*, and made to *terminate at this particular point*.

2d. The average distance from the city of New-York being but a trifle over four miles, makes the communication at all hours of the day *and night*, certain and easy. The ordinary time required by way of the Long Island railroad cars, (the longest route) *is about* 25 minutes, (including all stoppages on the road) to PENNSYLVANIA AVENUE, the centre point of the *manufacturing district*, situated half way between the principal ferries in the city of Brooklyn and the village of Jamaica on a *beautiful* plain gradually slooping to the south—protected on the north by a ridge of hills rising about 150 feet above the level of the sea, in the midst of a *highly cultivated* country, *producing* all the *necessaries of living upon its own soil.*

3d. The Long Island Railroad being destined to form

a new channel of communication between New-York and the Eastern cities, (Boston, Providence, &c.,) will, when completed, render this location eminently conspicuous to the general observation of travellers, and being immediately on the route of *this great Eastern* and *most expeditious thoroughfare, its value and importance* must be *greatly enhanced from this circumstance*.

In presenting this subject so directly to the consideration of Mechanics, at this particular juncture of our affairs, it seems incumbent on the proprietors, to state somewhat more in detail, the advantages which are expected to be derived from an early location in East New-York; but it is desired and expected that all persons wishing to purchase, will first visit the premises, and judge for themselves.

THIS TRULY INTERESTING SPOT MAY BE REGARDED IN REALITY AS FORMING A PART OF THE CITY OF NEW-YORK, (separated only by a narrow channel, and a small section of unimproved lands, barely sufficient to protect its inhabitants from the annoying, if not ruinous, effects of a crowded city, where vice and immorality exist to a great extent, alluring the young and inexperienced:) thus possessing all the advantages of the most important trade of *our whole* country with an uninterrupted open harbor at all seasons of the year, inviting and enjoying the commerce of the world; and yet, so far removed, as to be altogether free from the *excessive taxes*, for widening, grading, and laying out streets and avenues, the maintenance of paupers—expensive Police, &c., &c., all of which way be considered as special charges on the industry of those residing within the precincts of the City Corporation, and will be saved to those who may take their stand at East New-York.

The lands of East New-York can now be obtained at prices varying from 1-10th to 1-40th part of the prices of less desirable lands in the city of Newark, or from 1-20th to 1-80th part of the cost of lands in the upper Wards of the city of New-York. Under these circumstances, there can be no question as to the propriety and profit of investments here. The history of our country furnishes the strongest evidence in favor of early settlers in all advantageous situations, when they become purchasers of the soil; and the present plan of improvement is such as to facilitate and expedite (at the most reasonable cost,) every movement in the way of business. Goods may be landed on the Rail Road Dock, and forwarded to Pennsylvania avenue, (through which a Rail Road track is to be laid,) delivered at, and received again from, the door of the Manufacturer, and returned to the dock; thence by a single cartage, they may be placed on board of vessels, destined to any of the various markets throughout the country; thus affording greater facilities at a mere nominal expense, than can be found in any other part of the world, Manchester, in Engiand, not excepted, there being in our case but five and a half miles of Rail Road transportation, and in the other, 36.

The unexpected and most disastrous shock to commercial credit which, (within the short period of less than three months,) has so seriously affected our whole country, demands the solemn and deliberate consideration of all classes of reflecting men. But while the ordinary channels of intercourse between the Manufacturer (or Mechanic) and the Country Merchant, are almost entirely broken up, so as to occasion a breach between them in the way of business, from Maine to the remotest regions of the South and West; is it not a matter of deep importance to thousands of our most enterprising Manufacturers, Mechanics, and Artizans, to adopt, with sufficient promptness, such measures as will enable them to meet whatever demand there may be for the products of their industry, on such terms as will hereafter protect and guard them against a repetition of the losses attending the consignment of vast quantities of goods to a comparatively few individuals, to be sold on commission. Many articles of American Manufacturers are regarded by Merchants visiting New York as of prime necessity. Consequently when not found (as heretofore) in large quantities, they will be sought and picked up in small lots, either from the workshop of the Mechanic or from such agencies as will of necessity be established under their own eye, on the spot, as is the practice at Newark and many other places. NONE OF WHICH CAN BE SAID TO PRESENT SO MANY INDUCEMENTS FOR A NEW BEGINNER AS CAN BE FOUND AT EAST NEW-YORK. The plan determined on, as most likely to effect this object, it is believed, may now be commenced with every prospect of complete success, and we invite and solicit the special attention of all classes of Mechanics, Manufacturers, and Artizans throughout the country to the consideration of this important undertaking.

Work shops, and other necessary buildings for the accommodation of operatives, can now be erected on a cheap and economical scale at *East New-York*. This name has been adopted by common consent, as most appropriate for our infant city, which is destined before many years to *vie* with the populous and thriving city of Newark, and be able to accommodate, like that and other commercial places, Shoemakers—Hatters—Coachmakers—Wheelwrights—Enginemakers—Blacksmiths—Carpenters—Masons—Chairmakers—Brushmakers—Brewers—Curriers—Coopers—Carvers—Tin and Coppersmiths—Clothiers—Dyers—Milliners—Gunsmiths—Gilders—Painters—Furriers—Founders—Engravers—Lithographers—Cabinetmakers—Tailors—Printers—Glasscutters—Glassblowers—Grate makers—Harness makers—Galico printers—Pianoforte makers—Rope makers—Locksmiths—Jewellers—Machinists—Leather dressers—Cutlers—Blockmakers—Blind makers—Clock makers—Box makers—Bookbinders—Button makers—Cane seatmakers—and every other kind of business, connected with Manufacturing, as well as *Merchants*—Butchers—Bakers—Grocers—*Gardeners*.

There are thousands of persons now living in New-York, and other places in the United States, who have accumulated their little earnings in the Savings Bank, that now have an opportunity to purchase a spot of ground, and erect thereon a comfortable tenement at an extreme low rate, and where the business, constantly increasing will not only give them employment, but add greatly to the worth of their investment; so that while they are earning by labor, their real estate will be augmenting in value.—The high rents, and exorbitant expenses of living in the city always fall heaviest upon the laboring and poorer classes—in proportion to their means—but here, the poor man may purchase in a healthy country, with delightful water, and ocean air, a lot of ground, in *fee* for a less price than he is obliged to pay in New-York, for his yearly rent of a miserable hovel, crowded also under the same roof with so many as to endanger life.

There is nothing more certain, notwithstanding the state of the times, than that shoes—hats—clothing—provisions, &c., will be wanted by the community, and so will the poor man's labor.

In order that no person may be disappointed or deceived as to the value, situation or character of the property now offered for sale, a Land office has just been erected at the corner of Pennsylvania and Atlantic avenues, where maps, plans of improvement, and any other information (which may be required) can be had. For further particulars, apply to

JOHN R. PITKIN, No. 18 Wall-street,
(Office No. 27,) and see future advertisment.

4th July, 1837. 34—1t

It is gratifying to learn that *all* the friends of railroads are not disheartened.—The following notice is cheering to us, may it be so to others.

TO RAILROAD CONTRACTORS.—CENTRAL RAILROAD OF GEORGIA.—Proposals will be received at the office of this Company in Savannah, untill the first day of October next, for grading and preparing for the Superstructure twenty five miles of this road, extending westwardly from a point 26 miles from this city. The distance will be divided into 8 sections and the price per cubic yard for excavation and embankment—per acre for clearing and per 100 feet for grubbing, for each section, offered for, must be stated.

The country through which this part of the road is located is pine barren, and as healthy as any part of the State.

The Company have on hand a large quantity of implements such as barrows, shovels, waggons, carts, &c., which will be furnished at cost and charges, to such contractors as may desire it.

Plans and specifications of the work will be ready for inspection after the first of September, and all necessary information given on application to the subscriber.

L. O. REYNOLDS,
Engineer.

Savannah, Aug. 3rd, 1837. 33—t. 1st Oct.

The following notice of T. G. Bates, Esq., Canal Commissioner of Ohio, will, we hope, give employment to many who are now seeking work.

From the Dayton (Ohio) Journal, of 29th July.

EXTENSION OF THE MIAMI CANAL.

NOTICE TO CONTRACTORS.

PROPOSALS will be received on the 11th September next, at Sydney, Shelby County, Ohio, for constructing 17 miles of canal, along the valley of the Great Miami, from the mouth of Loramies Creek, to a point 6 miles above Sydney. The work to be contracted for, consists chiefly of an unusual proportion of bluff and steep hill side cutting—much high embankment—several small aqueducts—a number of culverts and 8 or 10 stone locks.

And on the 15th same month, proposals will be received at the town of St. Marys, for constructing about 26 miles of canal along the valleys of Loramies Creek and St Marys river, from a point 5 miles above Piqua to the town of St. Marys. The work on this part of the line, consists of much very heavy excavation and embankment, several small aqueducts and many small culverts. At the same time and place embankments for the great reservoir near St. Marys will also be offered for contract.

The commissioner will expect certificates of character and qualifications from well known or unquestionable authority, to accompany each proposal, unless the bidder is personally known to him or to the Principal or Resident Engineer.

For further particulars, plans, &c., apply to the Engineers on the line of canal or at their offices in Sydney and St Marys.

T. G. BATES.

33—t. 11th. Sep

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

						lbs.	
350 tons	2½	by	½,	15 ft in length, weighing		4 68/100	per ft.
280 "	2	"	½,	"	"	3 50/100	"
70 "	1½	"	½,	"	"	2½	"
80 "	1½	"	½,	"	"	1 25/100	"
90 "	1	"	½,	"	"	½	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾, 3, 3¼, 3½, 3¾, and 3¾ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

A. & G. RALSTON & CO.,
28 tf Philadelphia, No. 4, South Front-st

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR, Paterson, New-Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style, and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callendors; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR
Patterson, New-Jersey, or 60 Wall street, N.
51tf

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

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FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawaukeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakiehill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie, Canal, in the City of Rochester, N Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.
Rohester, Jan. 13th, 1837. 4—y

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleeckerstreet, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

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PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y. will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

TO RAILROAD CONTRACTORS.

SEALED proposals will be received at the office of the Selma and Tennessee River Railroad Company, in the town of Selma, Alabama, for the graduation of the first forty miles of the Selma and Tennessee Railroad. Proposals for the first six miles from Selma, will be received after the first of May, and acted on by the Board on the 15th May. Proposals for the ensuing 34 miles, will be received after the 10th May, but will not be examined until the 1st of August next, when the work will be ready for contract.

The line, after the first few miles, pursuing the flat of the Mulberry Creek, occupies a region of country, having the repute of being highly healthful. It is free from ponds and swamps, and is well watered.—The soil is generally in cultivation, and is dry, light and sandy, and uncommonly easy of excavation.—The entire length of the line of the Selma and Tennessee Railroads, will be about 170 miles, passing generally through a region as favorable for health as any in the Southern Country.

Owing to the great interest at stake in the success of this enterprise, and the amount of capital already embarked in it, this work must necessarily proceed with vigor, and I invite the attention of men of industry and enterprise, both at the North and elsewhere to this undertaking, as offering in the prospect of continued employment, and the character of the soil and climate, a wide and desirable field to the contractor.

Proposals may be addressed either to the subscriber, or to General Gilbert Shearer, President of the Company.

ANDREW ALFRED DEXTER, Chief Engineer.
Selma, Ala., March 20th, 1837. A 15 tf

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

Instrnments made to order and repaired. 1y 14

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN.